AD-A995335

NDL-TR-83 (E)
EXTRACTED VERS

INITIAL GAMMA DATA FROM NUCLEAR WEAPON TESTS 1948 THROUGH 1962

July 1965

Nuclear Defense Laboratory

Edgewood Arsenal, Maryland

NOTICE

This is an extract of Initial Gamma Data from Nuclear Weapon Test, which remains classified SECRET/RESTRICTED DATA as of this date.

Extract version prepared for:

Director

DEFENSE NUCLEAR AGENCY

Washington, D. C. 20305

June 1984

Approved for public release
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FOREWORD

This report has had classified material removed in order to make the information available on an unclassified, open publication basis, to any interested parties. This effort to declassify this report has been accomplished specifically to support the Department of Defense Nuclear Test Personnel Review (NTPR) Program. The objective is to facilitate studies of the low levels of radiation received by some individuals during the atmospheric nuclear test program by making as much information as possible available to all interested parties.

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It is the belief of the individuals who have participated in preparing this report by deleting the classified material and of the Defense Nuclear Agency that the report accurately portrays the contents of the original and that the deleted material is of little or no significance to studies into the amounts or types of radiation received by any individuals during the atmospheric nuclear test program.

All classified references contained here may remain. Per Ltr. on file dtd 9 Nov.'84

DEPARTMENT OF THE ARMY
US ARMY NUCLEAR DEFENSE LABORATORY
EDGEWOOD ARSENAL, MARYLAND 21010

IN REPLY REFER TO:

AMXND-E

15 MAR 1966

SUBJECT: Errata for NDL-TR-53 (AD 365-419), INITIAL GAMMA DATA FROM NUCLEAR WEAPON TESTS (U), dated July 1965

TO: Distribution

It is requested that changes to NDL-TR-53 be made as indicated below.

a. (C-FRD) Page 19, Table 1.1. Correct yields as follows:

Greenhouse George	
Plumbbob Boltzman	11.5 kt
Hardtack Humboldt	7.8×10^{-3} kt
Fish Bowl King Fish	

b. (U) Page 44, Table 3.2. Fourth column heading should be "Density". Second column values should be 1112.3 mb, 1009.3 mb and 1007.9 mb.

e. (U) Page 175, Table 3.100. Azimuth symbol for slant ranges of 527, 1014, 1509, 2006, and 2505 yards should be "b" instead of "a".

GROUP
Excluded from automatic downgrading and declassification

Document consists of 2 pages.
Copy 123 of 165.

NDL-65-SRD-200

AMXND-E 15 March 1966

SUBJECT: Errata for NDL-TR-53 (AD 365-419), INITIAL GAMMA DATA FROM NUCLEAR WEAPON TESTS (U), dated July 1965

f. (U) Page 179, Table 3.102. Change heading of the third column to "Film Type" and add the following column:

Uncorrected Gamma Dose
r
5550
1440
509
214

g. (SRD) Page 194, Table 3.111. Correct fission yields and HE thicknesses as follows:

Shot	HE Thickness
	cm
Mora	
Lea	
Socorro	

h. (U) Page 205, Table 3.119. Height of burst for Shot Johnie Boy should be minus 192 feet.

i. (U) Pages 206, 209, 211, and 213. Tables 3.121, 3.122, 3.123, and 3.124; units for slant range should be "feet".

HAROLD E. SHAW
Lt Col, CmlC
Commanding

ABSTRACT

(U) The data presented are a compilation of all reported initial gamma measurements made by the Department of Defense and other agencies, from Operation Sandstone (1948) through Operation Fish Bowl (1962). Where neutron data are available, the gamma measurements are corrected for the direct effect of the neutrons on the detector as well as on the detector's environment. Shield attenuation of the gamma dose was taken into account. Gamma-dose-times-distance-squared, versus distance for shot conditions, is graphically presented.

FOREWORD

(U) This is the fifth and final report dealing with the general topic of neutron effects on gamma detectors. It presents a compilation of neutron-corrected, initial-gamma-dose measurements obtained by Department of Defense and other agencies, from Operation Sandstone (1943) through Operation Fish Bowl (1962).

(U) This work was authorized under DASA NWER Subtask 06.007, Neutron Effects on Gamma Detectors and DASA NWER Subtask 06.042, Initial Radiation Studies. This compilation and correction of initial gamma data was started in October 1961 and completed in February 1964.

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVE

(U) The main purpose of this report is to present results of the initial gamma-dose measurements made by Department of Defense (DOD) agencies at nuclear weapon tests and the corrected initial gamma data, rather than to make comparisons or to draw conclusions. Other projects will delve more deeply into these subjects.

1.2 BACKGROUND

(U) A comprehensive report summarizing the data from initial dose measurements (0 to 1 minute after detonation) made at nuclear weapon tests has been needed for some time. The initial gamma dose measurements reported here were made by the following DOD agencies: the US Army Nuclear Defense Laboratory (USANDL), the US Army Signal Research and Development Laboratory (USASRDL), and the Radiological Safety (Rad Safe) Group at the test site. Gamma data which were compiled by the Los Alamos Scientific Laboratory (LASL), the National Bureau of Standards (NBS), and other agencies are presented where DOD data are not available and where the data of such agencies are needed for comparison. Information concerning the detonations for which gamma dose data are available is presented in Table 1.1. The yields quoted are based on current information and may be subject to minor changes.

(U) The Department of Defense did not fully participate in the measurement of gamma dose until Operation Tumbler-Snapper in 1952. Previously, Rad Safe had performed gamma-dose measurements on a one-shot basis during Operation Sandstone in 1948. Gamma dose was measured during Operation Greenhouse by the NBS and during Operations Ranger, Buster-Jangle, and Ivy almost exclusively by LASL. The US Army Signal Corps made gamma-dose measurements at the underground and surface shots during Operation Jangle; however, most of the detectors remained in fallout areas up to 50 hours.

(U) Film has been used at every operation since Sandstone to measure gamma dose. To provide energy independence and electronic equilibrium, various film holders have been used -- the most common being the NBS and LASL holders. In addition, silver-phosphate-glass blocks and needles, chemical-dosimeter systems, and cobalt-glass plates have been used at a number of the operations with varying degrees of success. Biological-type gamma-dosimeters were tested during Operation Greenhouse. However, the results obtained from all these systems were questioned because of the neutron response of the detector itself, as well as the interaction of neutrons with the shield used to protect the detectors from blast and thermal radiation. In many cases this interaction produced sufficient secondary gamma rays to cause an appreciable increase in the total dose measured by the detector.

(U) This report attempts to rectify this situation by correcting the initial gamma data for direct neutron interaction with the detector, for the interaction of neutrons with the shields, and for the attenuation of the initial gamma rays by the shields. An evaluation of the gamma dose produced by neutron interaction with the ground is also presented but not used as a correction since the ground is part of the fixed environment. To perform this work the USANDL obtained direct neutron interaction factors for available dosimeter films (References 1, 2, and 3) and correction factors for the secondary gamma radiation produced by neutron interactions with shields and soil (References 4 and 5). Direct neutron interaction factors for glass and chemical systems were obtained by other investigators (References 6,7,8,9, and 10). During Operation Sun Beam the theoretical calculations which produced the correction factors for shields and soil were experimentally verified (Reference 11).

(U) Recent work has indicated that these gamma dosimeters are dependent upon dose rate and total dose in a complicated fashion (Reference 12). Much more work will be necessary to clarify this situation.

(S-RD) TABLE 1.1 NUCLEAR DEVICES FOR WHICH INITIAL GAMMA MEASUREMENTS ARE REPORTED

Operation	Year	Test Location	Shot Designation	Name of Device	Yield
					kt
SANDSTONE	1948	Eniwetok	X-ray		36
		Eniwetok	Yoke		49
		Eniwetok	Zebra		18
RANGER	1951	Nevada	Able		1.3
		Nevada	Baker I		7.4
		Nevada	Easy		1
		Nevada	Baker II		7.7
		Nevada	Fox		22
GREENHOUSE	1951	Eniwetok	Dog		[illegible]
		Eniwetok	Easy		46
		Eniwetok	George		[illegible]
		Eniwetok	Item		[illegible]
BUSTER-JANGLE	1951	Nevada	Able		Insignificant
		Nevada	Baker		3.5
		Nevada	Charlie		14.0
		Nevada	Dog		21
		Nevada	Easy		31
		Nevada	Uncle (Underground)		1.2
		Nevada	Sugar (Surface)		1.2
TUMBLER-SNAPPER	1952	Nevada	Tumbler I		1.05
		Nevada	Tumbler II		1.17
		Nevada	Tumbler III		30
		Nevada	Snapper I		18.5
		Nevada	Snapper II		12.5
		Nevada	Snapper III		11.5
		Nevada	Snapper IV		15.8
		Nevada	Snapper V		13.9
IVY	1952	Eniwetok	Mike		1.04x10[4]
		Eniwetok	King		540
UPSHOT-KNOTHOLE	1953	Nevada	1 (Annie)		17.1
		Nevada	2 (Nancy)		24
		Nevada	3 (Ruth)		0.20
		Nevada	5 (Ray)		0.21
		Nevada	6 (Badger)		25
		Nevada	7 (Simon)		45
		Nevada	8 (Encore)		26
		Nevada	9 (Harry)		32.3
		Nevada	10 (Grable or Gun)		15
		Nevada	11 (Climax)		60
CASTLE	1954	Bikini	Koon		150
		Bikini	Union		7.0x10[3]
		Eniwetok	Nectar		1.7x10[3]

TABLE 1.1 (Continued)

Operation	Year	Test Location	Shot Designation	Name of Device	Yield
					kt
TEAPOT	1955	Nevada	1 (Wasp)		1.2
		Nevada	2 (Moth)		2.4
		Nevada	3 (Tesla)		6.8
		Nevada	4 (Turk)		[illegible]
		Nevada	5 (Hornet)		3.6
		Nevada	6 (Bee)		8.1
		Nevada	8 (Apple I)		14.2
		Nevada	9 (Wasp)		3.2
		Nevada	10 (High Altitude)		3.1
		Nevada	11 (Post)		1.45
		Nevada	12 (Met)		22.5
		Nevada	13 (Apple II)		28
		Nevada	14 (Zucchini)		28
REDWING	1956	Eniwetok	Yuma		
		Eniwetok	Erie		
		Eniwetok	Blackfoot		
		Eniwetok	Kickapoo		
		Bikini	Zuni		[illegible]
		Bikini	Flathead		
		Bikini	Dakota		
		Bikini	Navajo		
		Bikini	Tewa		[illegible]
PLUMBBOB	1957	Nevada	Boltzmann		[illegible]
		Nevada	Franklin		0.14
		Nevada	Wilson		10.3
		Nevada	Hood		71
		Nevada	Owens		9.7
		Nevada	Laplace		1.22
		Nevada	Priscilla		36.6
		Nevada	Diablo		17
		Nevada	Kepler		10.3
		Nevada	Stokes		19
		Nevada	Shasta		16.5
		Nevada	Doppler		10.7
		Nevada	Franklin Prime		4.7
		Nevada	Smoky		44
		Nevada	Galileo		11.5
		Nevada	Fizeau		11.4
		Nevada	Whitney		18.5
		Nevada	Charleston		11.6
HARDTACK	1958	Eniwetok	Fig		[illegible]
		Nevada	Mora		[illegible]
		Nevada	Lea		[illegible]
		Nevada	Hamilton		[illegible]
		Nevada	Socorro		6.2
		Nevada	Humboldt		[illegible]
SUN BEAM	1962	Nevada	Small Boy		1.65
		Nevada	Little Feller I		18x10[-3]
		Nevada	Little Feller II		22x10[-3]
		Nevada	Johnie Boy		0.500
FISH BOWL	1962	Johnston Isl	Star Fish Prime		[illegible]
		Johnston Isl	Blue Gill Triple Prime		
		Johnston Isl	King Fish		

CHAPTER 2

PROCEDURE

2.1 GENERAL

(U) The gamma data were taken directly from weapon test (WT) reports for each operation. Actually the reported gamma dose data are not strictly initial gamma data but represent gamma doses received up to the time of recovery of the detectors, often hours after detonation. Recent innovations have greatly reduced the exposure time of the gamma detectors, but during the earlier operations the gamma detectors remained in the field for lengthy and often unreported times. Most of the detectors were exposed upwind of the detonation to minimize the fallout-gamma contribution. Table 2.1 gives the recommended ranges of most of the dosimeters.

(U) Dosimeter films were the major gamma-measuring system used at weapon tests. Films seem to be sensitive to every variable known to mankind, and they may be sensitive to some not known. Use of film as a gamma dosimeter for controlled laboratory experiments presents some difficulties in interpreting the data; but use of film at weapon tests, where little control is maintained and where the quality and type of radiation are unusual, presents extreme difficulties. The NBS and aluminum-wood (AW) film badges have minimized but not eliminated energy dependence of the films. Minimization of the field variables has progressed from test to test so that now it is believed that the gamma dose can be interpreted to within 25-35 percent.

(U) Direct line of sight to the detonation point was assumed for all gamma and neutron data. Where the gamma data overlapped the dosage range of two films, an educated guess was made as to which film was used unless the original data were specified. Since the protective shields were not always adequately described, a number of assumptions concerning size, thickness, and composition had to be made in some cases. Factors for direct neutron interaction with film were determined only for film encased in the NBS holder. These interaction factors were assumed to be applicable also to the AW LASL film holder. Very limited experimental data indicate that the above assumption is reasonable, at least for thermal neutrons. Finally, the neutron-interaction factors obtained for the newer films were assumed to be applicable to the obsolete films of the same dose range.

(U) TABLE 2.1 RECOMMENDED DOSIMETER RANGES

Dosimeter Type	Recommended Range
	r
Emulsion 502	0.3 - 10[a]
Emulsion 508	0.3 - 10[a]
Emulsion 510	10 - 35[a]
Emulsion 606	35 - 2500[a]
Emulsion 1290 (Adlux)	35 - 2500[a]
Emulsion 548-0 (double coat)	1000 - 10,000[a]
Emulsion 548-0 (single coat)	2500 - 50,000[a]
Emulsion 649	2500 - 50,000[a]
$AgPO_3$ glass	10 - 10,000[b]
$AgPO_3$ glass	10 - 100,000[c]
Cobalt plates	10^4 - 10^8
Thermoluminescent	0.005 - 10,000
Chloroform	1 - ~ 100,000
Tetrachloroethylene	1 - 10^8 [d]

[a]Range depends upon method of processing and calibration procedure. LASL regularly used 548 emulsion only to 30,000r whereas the Signal Corps used the 548 emulsion to 80,000r.
[b]Glass that has not been heat-annealed.
[c]Glass that has been heat-annealed.
[d]This is the overall useful range. To cover the range, inhibitors must be added and each combination of inhibitor and tetrachloroethylene has its own useful range.

2.2 TREATMENT OF NEUTRON FLUX DATA

(U) To obtain neutron data at stations where such data were not reported, graphs of neutron-flux-times-slant-range-squared versus slant-range were prepared. Extrapolations were made of the curves to the distances of interest.

2.3 NEUTRON SENSITIVITY OF GAMMA DETECTORS

(U) The neutron sensitivities of the gamma detectors vary with neutron energy as shown in Table 2.3. The reliability of the fast-neutron film sensitivities can not be estimated since the values are taken from single measurements. To use the fast-neutron sensitivities of those dosimeters

(U) TABLE 2.2 NEUTRON ACTIVATION DETECTORS

Detector	Reaction	Products	Neutron Energy Measured
Au^{197}	n, γ	Au^{198}	≤ 0.3 eV
As^{75}	n, γ	As^{76}	≤ 0.3 eV
Pu^{239}	Fission	Mixed fission products	> 10 keV
Np^{237}	Fission	Mixed fission products	> 0.63 MeV
U^{238}	Fission	Mixed fission products	> 1.5 MeV

(U) TABLE 2.3 NEUTRON SENSITIVITIES OF DOSIMETERS

Dosimeter	Thermal		Neutron Energy (MeV) 1		2	4	6	8	14
	$10^9 (n/cm^2)/r$		$10^9 (n/cm^2)/r$						
Emulsion 508	3.6	±0.90	110		75	27	20	6.5	
Emulsion 510	4.8	±1.2	10		5.5	3.8	2.9	1.6	0.83
Emulsion 1290	4.9	±1.2	18		11	5.5	4.0	2.5	1.2
Emulsion 502	4.0	±1.0	80		40	20	15	7.5	
Emulsion 510	4.6	±1.15	20		9.5	5.0	3.0	2.1	
Emulsion 606	4.4	±1.1	28		12	9.0	6.5	2.5	1.2
Emulsion 649	40	±10	1.9[a]	±0.48					
Emulsion 548	8.8	±2.2	2.9[a]	±1.0					
$AgPO_3$ glass	3.0	±0.38	60[a]						
Cobalt plates	0.14[b]	±0.04	c-a						
Thermoluminescent	5.0		5.7[a]						
Chloroform	1.5		d						
Tetrachloroethylene	5.9		~ 500						

[a]Value is an average for neutrons having thresholds greater than 10 keV.
[b]Unpublished data.
[c]Estimated to be 5×10^{10}.
[d]No definite value reported.

for which values at only 1 MeV are available, the assumption must be made that the average value of the weapon's fast-neutron spectrum is 1 MeV. At stations where the full set of neutron activation detectors was not available, an average energy of 1 MeV for fast neutrons was assumed and only the neutron sensitivities at 1 MeV were used for any gamma detectors exposed. Actually the neutron sensitivity values obtained for emulsions 548 and 649 and the thermoluminescent dosimeter were obtained by exposing them to a fission spectrum and reporting the values at an average energy of 1 MeV.

2.4 DETECTOR SHIELD CORRECTIONS

(U) The corrections for the gamma dose produced by neutron interactions with a number of popular shields have been reported in Reference 4 and are reproduced in Table 2.4. The contributions of thermal neutrons (radiative capture) and fast neutrons (inelastic scattering) have been taken into account. Induced activity in the shield is neglected (except for aluminum shields), since calculations have shown that its contribution is less than two percent. The inelastic scattering cross sections below 0.63 MeV are negligible.

(U)(~~S-RD~~) As the distance from ground zero increases, the gamma spectrum hardens (Reference 17) and the attenuation factor for shields would be expected to decrease. For surface and low-air bursts of less than 500 kt, the average gamma energy is considered to be 1 MeV at distances from ground zero to 1000 yards, 3 MeV from 1000 to 3000 yards, and 5 MeV at greater than 3000 yards. The spectrum of gamma radiation from weapons greater than 500 kt is expected to be considerably softer than that for low-yield weapons, since the major portion of the dose is delivered by the hydrodynamically enhanced fission-product radiation. For these weapons, the average gamma energy is considered to be 1 MeV up to 2000 yards from ground zero and 3 MeV for greater distances. The shield attenuation factors are reported in the initial gamma dose tables for each shot

2.5 INTERACTION OF NEUTRONS WITH SOIL

(U) The gamma contribution from the interaction of neutrons with the soil is reported but has not been used to correct the gamma data, inasmuch as the soil is part of the fixed environment. By means of the method outlined in Reference 5, the gamma doses were calculated for various soils for fluxes of $1x10^{12}$ thermal neutrons per square centimeter

(U) TABLE 2.4 GAMMA DOSE FROM VARIOUS SHIELDS SUBJECTED TO A THERMAL NEUTRON FLUX OF 1×10^{12} n/cm^2 AND A FAST NEUTRON FLUX IN EACH ENERGY INTERVAL OF 1×10^{12} n/cm^2

Shield	Gamma Dose for Various Neutron Energies				
	Thickness	Thermal	0.63-1.5 MeV	1.5-3.0 MeV	Over 3 MeV
	cm	r	r	r	r
Cast Iron Condulet	0.368	200	3.29	10.4	22.5
Steel Cylinder (Emmett Device)	0.510	320	5.19	16.2	34.7
Steel Pipe Nipple	0.551	340	5.53	17.2	36.7
Steel Pipe Nipple	0.635	380	6.26	19.5	41.4
Steel Pipe Nipple	0.762	430	7.37	22.5	47.3
Steel Pipe Nipple	1.142	630	9.91	30.4	62.8
Aluminum Can	0.159	3.8	0.130	1.15	0.699
Aluminum Can	0.318	7.6	0.260	2.26	1.34
Iron Stakes	0.635	190	3.13	9.75	20.8

and 1×10^{13} fast neutrons per square centimeter. To obtain the soil gamma contribution at specific slant ranges for the various detonations, the actual thermal- and fast-neutron fluxes, the fraction of the neutrons actually absorbed by the soil, and the build-up factor had to be taken into account. Details are given in the Appendix.

2.6 COMPARISON OF LASL AND ESL FILM DATA

(U) A comparison of the LASL film data with the Evans Signal Laboratory (ESL) film data shows that the LASL data are consistently higher than the ESL data. An investigation into the cause of these discrepancies was carried out by LASL during Operation Teapot and reported by Storm and Bemis (Reference 18), who recommended that all the LASL data be lowered by 13 percent because of calibration difficulties. In comparison with energy-independent ion chambers, the individual emulsion results obtained by use of the LASL holder were high by factors varying from 10 to 20 percent, and the individual emulsion results obtained by use of the NBS holder were low by factors varying from 7 to 19 percent. The 13-percent calibration factor is used in this report to correct the LASL film data. Describing the LASL film data in this report as uncorrected, means that the data have not been corrected for neutron effects but have been corrected for calibration error. The individual emulsion corrections are not applied in this report, since they are applicable only at distances of 1700 to 3300 yards, and to the type of shots for which they were measured. The individual emulsion variation is assumed to be due to the energy dependence of the emulsion: the emulsions in the LASL holder are more sensitive to the lower-energy gamma rays than are the emulsions in the NBS holder. Since the gamma spectrum is softer at distances closer to ground zero, the correction factors should be different. Currently the average between the LASL and ESL gamma data appears to present a good estimate of the gamma dose.

(U) An example of the calculations used to obtain the correction factors is presented in the Appendix. Formulae for correcting the data to other air densities are also presented in the Appendix.

(U) All shot information was obtained from References 19 and 20. Unless otherwise specified, the meteorological data were obtained at ground level. The meteorological data tables include slant-range-correction factors and dose-correction factors as well as temperature, pressure, and density values.

CHAPTER 3

RESULTS

3.1 OPERATION SANDSTONE

(U) Operation Sandstone, conducted at the Pacific Proving Grounds (PPG) during April and May 1948, consisted of three tower shots. A summary of the shot information is presented in Table 3.1 and the meteorological conditions at shot time are given in Table 3.2.

(U) The gamma measurements were performed by Rad Safe (Task Group 7.6) with film badges (Reference 21). Six film types covering the range from 0.05 to 22,500 r were packaged in lightproof packs with a 1/32-inch lead cross over the front, and sealed in an aluminum-foil jacket. The film badges were attached to 2x2x3/16-inch angle-iron stakes at distances of less than 1000 yards and to 1x1x3/16-inch angle-iron stakes at distances of greater than 1000 yards. Energy dependence of the film badge was poor, since excessive response to radiation below 300 keV was noted. All the film badges remained in the field for 12 to 30 hours after detonation, generally in the upwind direction. Residual contamination was estimated from field survey data to be negligible as compared to the film readings.

(U) Neutron-flux measurements were made by Los Alamos Group LAJ-3 with threshold detectors (Reference 13). Since no plutonium data were available, the total fast-neutron flux was calculated as described in Chapter 2.

(U) The gamma data and corrections are presented in Tables 3.3, 3.4, and 3.5. Figures 3.1, 3.2, and 3.3 show the corrected gamma-dose-time-the-slant-distance-squared as a function of slant distance.

3.2 OPERATION RANGER

(U) Operation Ranger, the first operation at the Nevada Test Site (NTS), was conducted during January and February 1951 and consisted of five airdrops. Shot information is summarized in Table 3.6, and meteorological data are presented in Table 3.7.

(U) Gamma measurements were obtained with film dosimeters by the Rad Safe group of LASL for all the shots (Reference 22). Three film types covering the range of 0.1 to 3000 r were packaged in a lightproof paper jacket with a 1/8-inch lead clip placed over each unit, sealed in a plastic jacket, and placed between two 1/2-inch wood blocks which were held together by an aluminum box to approximate the more recent AW film badge. The film badge was attached to angle-iron stakes, the dimensions of which were not reported. Two lines, 90° apart, were instrumented: Generator Road ran due south and Access Road ran due west. Recovery was effected 5 to 6 hours after detonation; but, since no local fallout was present, recovery time was not critical.

(U) Thermal-neutron measurements were made by LASL with gold detectors (Reference 13). No fast-neutron measurements were made. The sulfur-neutron flux for Shots Able and Fox might have been estimated if the gold-neutron data from these shots had been found to be comparable to the gold-neutron data from the similar Shots Tumbler II and Buster Dog. However, since the gold-neutron data agreed only within a factor of two, estimation of the sulfur-neutron flux by this method would be inaccurate.

(U) The uncorrected gamma data are presented in Tables 3.8 thru 3.12, and the uncorrected gamma-dose-times-slant-distance-squared versus slant distance are shown in Figures 3.4 thru 3.13.

3.3 OPERATION GREENHOUSE

(U) Operation Greenhouse consisted of four tower shots detonated at the PPG during April and May 1951. A summary of the shot information is presented in Table 3.13, and the meteorological conditions at shot time are given in Table 3.14.

(U) The gamma measurements, which consisted of the use of films encased in NBS holders, were obtained by the NBS (Reference 23). Four films were used to cover the range of 0.1 to 80,000 r, but one -- the Eastman 5302 positive -- was used as a performance check of the DuPont 605. The NBS film holder consists of thin layers of tin and lead to provide reasonable energy independence, and a thick layer of bakelite to provide electronic equilibrium. The film badge was attached to a 2½-inch pipe. Since no further information concerning the pipe is given, the pipe is assumed to be of steel and 1/8-inch thick. No azimuth was given from ground zero. No corrections for the effect of fallout need to be made since the fallout was negligible (Reference 24).

(U) Neutron-flux measurements were made by LASL, with gold and sulfur detectors (Reference 25). The fast-neutron flux has been again calculated from the sulfur data.

(U) The gamma data and the neutron corrections are presented in Tables 3.15 thru 3.18, and the plots of gamma-dose-times-slant-range-squared versus slant-range are shown in Figures 3.14 thru 3.17.

3.4 OPERATION BUSTER-JANGLE

(U) Operation Buster-Jangle consisted of seven shots at the NTS: the first was a tower shot, the next four were airdrops, the sixth was a surface shot, and the last was an underground shot. A summary of the shot information and the meteorological conditions at shot time is presented in Tables 3.19 and 3.20.

(U) Gamma dose measurements were obtained by LASL (Reference 26) from all detonations except Able and the surface shot, and by Signal Corps Engineering Laboratory (SCEL) (Reference 27) from the surface and underground shots. LASL used a series of five films to cover the range of 0.1 to 30,000 r. The films were exposed in the AW holder attached to an angle-iron stake driven into the ground. Films were recovered from 3 to 6 hours after detonation. No local fallout was recorded for the first five shots (Reference 24).

(U) SCEL also used five films to cover the range from 0.5 to 10,000 r. The films were exposed in NBS holders, but the report does not mention how the film badges were positioned or whether shields were used. Unfortunately, most of the films remained in the fallout field up to 50 hours after detonation. To ascertain the initial gamma dose, the fallout dose from one minute up to recovery time must be subtracted from total dose. The fallout data were obtained from Reference 28.

(U) Neutron-flux measurements were made by LASL (Reference 29) for the first five shots. Gold- and sulfur-neutron data for the surface and underground shots are available in Reference 13.

(U) The gamma doses and the neutron and fallout corrections are presented in Tables 3.21 thru 3.26. Graphs of corrected gamma-dose-times-slant-range-squared versus slant-range are given in Figures 3.18 thru 3.21.

(U) The neutron fluxes for the surface and underground shots at the slant ranges of interest are too small to permit meaningful correction factors to be obtained, and the initial gamma doses obtained by correcting for fallout are very erratic. Therefore, no graphs are presented for these two shots.

3.5 OPERATION TUMBLER-SNAPPER

(U) Operation Tumbler-Snapper was conducted at the NTS during April, May, and June 1952. The operation consisted of four airdrops and four tower shots. The pertinent shot information is presented in Table 3.27, and the meteorological data at shot time are presented in Table 3.28.

(U) The gamma measurements were made by two groups: LASL (Reference 30) and SCEL (Reference 31). LASL used film in the AW holder, mounted on angle-iron stakes; SCEL used film in the NBS holder attached to aluminum stakes. Neither group mentions azimuth or fallout effects -- except for Snapper III -- when the cloud passed over the LASL line. It was assumed that the films were placed upwind of the other shots where fallout had little effect. However, the LASL results are consistently higher than the SCEL results, and possibly the LASL films recorded some fallout radiation. Shot 1 was not instrumented for gamma measurements.

(U) The neutron data for Shots 3, 4, and 8 were taken from measurements made by the Naval Research Lab (NRL) (References 32 and 14). The LASL obtained neutron data at Shots 4, 5, 6, 7, 8, which are recorded in Reference 33. Reference 13 records neutron-flux data for all eight shots during this operation.

(U) The SCEL gamma data for Shots 2 thru 8 are presented in Tables 3.29 thru 3.35 with their appropriate correction factors. Tables 3.36 thru 3.42 give the LASL film data without neutron corrections. Figures 3.22 thru 3.28 present the corrected SCEL gamma-dose-times-slant-range-squared versus slant-range.

3.6 OPERATION IVY

(U) Operation Ivy, held at the PPG during October and November 1952, consisted of two large-yield shots: Mike, a surface shot, and King, an airdrop. Shot information and meteorological data are given in Tables 3.43 and 3.44, respectively.

(U) Gamma measurements were made by LASL on both shots with film (Reference 34). The film types used are the same as specified for Operation Tumbler-Snapper. To obtain initial gamma data in the heavy-fallout field expected from Mike, a film-drop gadget was used whereby films exposed to radiation for a predetermined time would automatically drop below ground level into a radiation-protected area. Unfortunately these gadgets did not work, and many were filled with water, sand, and debris. The few films that did drop indicated much smaller doses than those films which remained above ground. Although the time of dropping is unknown, the films might reasonably be assumed to have dropped before the arrival of fallout. Only the dropped-film data are presented with error limits which do not include the error due to dropping time. No neutron corrections are presented since the neutron flux was negligible.

(U) The AW film badge was assumed to be bolted to angle-iron stakes for Shot King. All film badges located from 700 to 1700 yards from ground zero were destroyed; the rest were recovered the day after the shot. Survey readings indicated that residual activity was negligible. All gamma stations for both shots were on land.

(U) Reference 13 gives some gold and sulfur data for the two shots. These data were extrapolated to the slant ranges of interest.

(U) The gamma data for both shots as well as the neutron corrections for Shot King, are presented in Tables 3.45 and 3.46. Corrected gamma-dose-times-slant-range-squared versus slant-range for Shot King is given in Figure 3.29.

3.7 OPERATION UPSHOT-KNOTHOLE

(U) Operation Upshot-Knothole was conducted at the NTS from March to June 1953. The operation consisted of 11 detonations highlighted by Shot 10, which was an atomic weapon fired from a cannon. The pertinent shot information and meteorological data are given in Tables 3.47 and 3.48 respectively. It should be noted that in some of the WT reports for this operation, the order of Shots 5 and 6 and Shots 8 and 9 was reversed. Table 3.47 lists the shot numbers strictly according to chronological date of detonation.

(U)(S-RD) Initial gamma measurements were made by LASL (Reference 35) for Shots 5, 6, 10, and 11 and by SCEL (Reference 36) for Shots 1, 2, 3, 5, 6, 7, 8, 9, and 10. The SCEL gamma detectors consisted of five film types encased in NBS holders and attached to aluminum stakes assumed to be 1/4-inch thick. The film range was from 0 to 12,000 r. The detectors were recovered approximately 3 hours after detonation. No azimuth is given for Shots 1, 3, 6, and 9, and no mention is made of corrections being necessary for fallout contributions. From comparison of fallout contours for this operation (Reference 24), the initial gamma detectors obviously were placed far enough from ground zero, if they were in either the upwind or cross wind direction, for the fallout effect to be negligible. Large limonite blocks were placed in the towers for Shots 2 and 7 in such a position as to attenuate the radiation east of the tower. The gamma line for Shot 2 was east, and the gamma lines for Shot 7 were eas and south. Only the south line data are reported for Shot 7. Neutron corrections were made in Reference 36 for the gamma data obtained for Shot 10. The neutron correction factors used in Reference 36 are erroneous and the neutron fluxes used are suspect. SCEL was one of the groups which reversed the order of Shots 5 and 6, and Shots 8 and 10. SCEL reported distances as radial distance from GZ, not as slant range.

(U) (S-RD) LASL obtained their gamma measurements from five film types in the AW holder attached to angle-iron stakes. The films covered the range from 0.1 to 2000 r. No azimuths are given for Shots 5, 6, and 11, and no mention is made of fallout affecting the detectors. Variation of gamma exposure with height above the ground, from one-half foot to 10 feet, was measured at Shot 10; the variation did not exceed ±5 percent for the slant distances of 2000 to 3000 yards.

(U) The gamma data obtained by the two projects agreed fairly well for Shots 6 and 10. The LASL data were slightly higher for Shot 5.

(U) (S-RD) Neutron measurements were made by LASL (Reference 37) for Shots 1, 2, 3, 5, 6, 7, and 10, and by NRL (Reference 38) for Shots 8, 9, and 10. The neutron data for Shot 10 were taken from NRL data. Unfortunately, some of the LASL neutron data were taken for diagnostic measurements and were unusable for this report.

Plutonium-neutron data are available for Shots 8, 9, 10 (Reference 39). Since this was the first attempt to measure neutron flux with plutonium detectors and the objective of the project which obtained the plutonium-neutron data was to obtain ratios between neutron flux inside and outside Civil Defense shelters, it was decided not to use these data.

(U) The SCEL gamma data and the neutron corrections, where available are presented in Tables 3.49 thru 3.57. Curves of the SCEL gamma-dose-times-slant-distance-squared versus slant-distance are presented in Figures 3.30 thru 3.38. The LASL gamma data and neutron-flux data are given in Tables 3.58 thru 3.61. The LASL gamma data for Shot 11 times-slant-range-squared versus slant-range are presented in Figure 3.39.

3.8 OPERATION CASTLE

(U) Operation Castle was conducted at the PPG during the period March thru May 1954. The operation consisted of six detonations: two land-surface and four barge shots. Pertinent shot information and meteorological data for the three shots for which gamma data are available are presented in Tables 3.62 and 3.63, respectively.

(U) Initial gamma measurements were attempted by the USA Signal Engineering Laboratories (SEL) for Shot. 1, 2, 3, 4, and 6 (Reference 40). Most of the detectors were either destroyed or contaminated so that data from only nine stations from Shots 3, 4, and 6 were usable. Data were obtained from NBS film badges and chemical dosimeters shielded by 0.25-inch aluminum pipes.

(U) Neutron data for Shots 4 and 6 are available from Reference 41. Data from only two neutron stations are reported for Shot 6, and only two of the eight stations for which neutron data are available for Shot 4 had clear line of sight. No neutron data were obtained for Shot 3. In general the neutron results are inadequate because of contamination, excessive time lapses before recovery, and loss of stations.

(U) The gamma data from Shots 3, 4, and 6 are presented in Tables 3.64. No neutron data or corrections are shown. Curves of gamma-dose-times-slant-distance-squared versus slant-distance for Shots 3 and 6 are given in Figures 3.40 and 3.41.

3.9 OPERATION TEAPOT

(U) Operation Teapot was conducted from February thru May 1955 at the NTS. The operation consisted of fourteen detonations: ten tower shots, three airdrops (one of which was a high-altitude detonation), and one underground shot. Table 3.65 provides the pertinent information for the shots for which gamma measurements were made. The meteorological data are given in Table 3.66.

(U) Gamma measurements were made by a number of groups during Operation Teapot; however, only the LASL (Reference 42) and USA Signal Research and Development Laboratory (SRDL) (Reference 43) projects were mainly concerned with free field initial gamma measurements. Gamma data from chemical dosimeters are presented for Shots 9 and 10 (Reference 44) to supplement the SRDL data. These chemical dosimeter values are considered to be less accurate than the film data, since the fast-neutron sensitivity of these dosimeters was unknown. Edgerton, Germeshausen, and Grier, Inc. (EG&G) reported many film gamma measurements for a shielding project

(Reference 45). Results of gamma measurements made by EG&G outside the shields were consistently much lower than the SRDL results at the same slant range. No neutron corrections can be made on the EG&G measurements because a weak film developer was used. These measurements are not reported here.

(U) Los Alamos Project 13.3a (Reference 42) attempted to resolve the discrepancy between the Los Alamos AW film badge and the NBS film-badge results, by comparing them with energy-independent Victoreen thimble chamber readings. The results were discussed in Chapter 2. The NBS and AW badges were exposed on metal stakes to the radiation from Shots 6, 8, 9, 13, and 14. The measurements obtained from Shot 13 were affected by the cloud passing over the instrument line. The NBS film-badge results obtained by LASL are presented to supplement the SRDL gamma data and no distinction is made between the two in the table.

(U) The bulk of the gamma data reported was obtained from the SRDL measurements. The NBS film badges were exposed in aluminum holders attached to metal stakes. It was assumed that the aluminum holders were 1/16-inch thick so that attenuation of the gamma radiation was negligible. The dosimeters were exposed in the upwind direction and recovered as soon as practicable; therefore no residual radiation corrections were necessary. The film badges were exposed in 3/8-inch steel drop canisters for the high-altitude shot. Windows covered with 1/16-inch aluminum were drilled in the canister to expose the film. However, if the radiation did not enter directly through the aluminum window it had to pass through the steel shell as well as the surrounding instrumentation which was not described. Since the orientation of the canisters is not reported, no shield corrections were made for this shot.

(U) SRDL used "betatron correction factors" to account for a difference in calibration curves for the various emulsions when using Co^{60} radiation as opposed to betatron radiation. These factors are ignored in this report, since "betatron correction factors" reported in Appendix C of Reference 45 -- which were obtained by use of the same betatron machine and film eumlsions as those used by SRDL -- do not agree with SRDL results. SRDL considered the "betatron correction factors" for previous operations to be negligible except for 508 film emulsion which was not used during Operation Teapot. No experimental confirmation was obtained for the "betatron correction factors", during subsequent operations.

(U) The underground detonation, Shot 7, was instrumented with NBS film badges to obtain residual radiation measurements and is not described in this report. The Shot 11 gamma data out to 1204 yards are a composite of 0°, 45° and 90° lines. The gamma data at 412, 510, and 608 yards for Shot 11 are questionable because the emulsions used at these stations were exposed below or above their normal ranges.

(U) ~~(S-RD)~~ Most of the neutron data are taken from Reference 46 prepared by the NRL. The data are presented in the form of graphs of nvt-times-R^2 versus slant-range and are therefore subject to interpretive errors. The gold-neutron data for Shot 5 show a large upward deviation from the straight-line curve at distances closer than 550 yards. This fact is confirmed by neutron data obtained from Reference 44. The thermal-neutron data used in this report for Shot 5 are the actual measurements and not the straight-line extrapolations. The sulfur-neutron data for Shot 3 seem low when compared to those for Shot 11, the same device with only a few modifications. The Pu, Np, and U data for Shot 11 were obtained at only four distances and no closer than 510 yards. The extrapolation of the neutron curve for Shot 11 may be somewhat in error, especially at distances closer than 510 yards. The fact that the neutron corrections exceeded the total dose on the film at 316 yards also indicates that the extrapolation of the neutron curves to the shorter distances may be in error. The total fast or Pu neutron flux for Shot 3 was estimated using Pu to S ratio for Shot 11.

(U) The gamma data are presented in Tables 3.67 thru 3.79. Curves of gamma-dose-times-slant-range-squared versus slant-range are presented in Figures 3.42 thru 3.54.

3.10 OPERATION REDWING

(U) Operation Redwing was conducted at the PPG from May thru July 1956. The operation consisted of seventeen detonations: two airdrops, five water-surface shots, three limited-land-surface shots, six tower shots, and one shot on a barge in shallow water over a reef. Table 3.80 provides the pertinent information for the shots for which successful gamma measurements were obtained. The meteorological data are given in Table 3.81.

(U) Gamma measurements were made by SEL (Reference 47), LASL (Reference 48), and the US Army Chemical Warfare Laboratories (CWL) (Reference 49). LASL attempted to differentiate the initial-gamma-radiations versus time by using films in "drop gadget" instruments during Shots Dakota, Navajo, and Tewa. Only data from Shot Navajo were usable.

(U) SEL obtained initial gamma data from Shots Zuni, Flathead, Dakota, Navajo, and Tewa. The NBS film badge positioned in a number of different shields was used as the primary dosimeter. Station and mutual dosimeter shielding factors (effects of one detector on another) were calculated by SEL. However, the estimation of the average gamma energy at the distance of interest was incorrect and new gamma shielding factors were calculated for use in this report. Film normalization factors (betatron correction) were used by SEL. They were the same factors as those used during Operation Teapot, since betatron calibrations could not be made for this Operation. Again, as for the Teapot data, these factors are ignored. Corrections for preshot and postshot residual contamination were obtained by using drop-type mechanisms, field surveys, and estimations.

(U) CWL was mainly interested in neutron measurements, but chemical dosimeters were placed in 0.434-cm thick and 1.5-inch diameter steel pipe nipples to measure gamma as well as neutron dose for Shots Yuma, Erie, Blackfoot, and Kickapoo. The US Air Force (USAF) and the Atomic Energy Commission (AEC) supplied chlorinated hydrocarbon systems to measure gamma dose.

(U) The USAF chloroform dosimeter provided the bulk of the gamma data. The type of chemical used in the AEC chemical dosimeter was not elucidated. Thermal-neutron corrections were made on the USAF chloroform dosimeter using the value of 1.5×10^9 $n/cm^2/r$ recommended in Reference 10. The USAF chloroform dosimeter is claimed to be "fast neutron insensitive". However, the interpretation of the term "fast neutron insensitive" is open to question, since no definite sensitivity values have been obtained. No corrections are presented for the AEC chemical dosimeters.

(U) Neutron data for Shots Yuma, Erie, Blackfoot, and Kickapoo are available from Reference 49. No extrapolation of the data was necessary, since the neutron and gamma measurements were made at the same stations. No neutron data are available for Shots Zuni, Flathead, Dakota, Navajo, and Tewa.

(U) The gamma data and neutron corrections (where available) are tabulated in Tables 3.82 thru 3.90. The station and mutual shielding factors are presented for Shots Zuni, Flathead, Dakota, Navajo, and Tewa, but the shield corrections are not presented since neutron corrections must be made first. These results are corrected for residual and preshot exposures. Curves of corrected gamma-dose-times-slant-range-squared versus slant-range are given in Figures 3.55 thru 3.63.

3.11 OPERATION PLUMBBOB

(U) Operation Plumbbob was conducted at the NTS from April thru October 1957. It was the first operation in which a nuclear device was suspended from a balloon for detonation and the first in which rocket delivery of a nuclear warhead from an in-flight aircraft was employed. The operation consisted of thirty detonations: one one-point shot, one tunnel shot, five safety shots, one air shot, nine tower shots, and thirteen balloon shots. A summary of the shot information is presented in Table 3.91, and the meterorological conditions at shot time are given in Table 3.92.

(U) Gamma measurements were made by SRDL (Reference 50), US Air Force School of Aviation Medicine (SAM) (Reference 51), Air Force Special Weapons Center (AFSWC) (Reference 52), EG&G (Reference 53), and a number of different agencies for Program 2 during Shot LaPlace (Reference 54).

(U) ~~(S-RD)~~ AFSWC measured the variation in gamma dose with height aboveground using a variety of detectors and found that the gamma dose increased by about a factor of 1.3 at an altitude of approximately 400 feet. They deduced that the initial gamma radiation is nearly monodirectional and that the bulk of the scattered radiation is of low energy. Selected NBS film badge and chemical dosimeter (SAM) data at 3-foot heights are presented herein to supplement the other gamma data. Hurst and Ritchie (Reference 55), using fission foils and chemical dosimeters in collimators, confirmed that the angular distribution of the neutron and gamma radiation at the ground was insensitive to weapon and distance and that the gamma buildup was approximately 30 percent.

(U) The EG&G film gamma data are presented only for shots where no other gamma data were available. EG&G used a weak film developer, Kodak D-76; the neutron effect on film is impossible to determine when this developer is used (Reference 56). Information was also lacking concerning position and type of stations. The EG&G film badge is very similar to the NBS film badge.

(U) The SAM used the tetrachloroethylene two-phase chemical dosimeter to measure the initial gamma dose. The dosimeter is claimed to be fast-neutron insensitive; that is, if exposed to one rep of fast neutrons with no gamma rays present, the dosimeter would generate 0.83 percent as much acid as it would for 1 r of gamma radiation. Therefore, no corrections are necessary for fast-neutron sensitivity. The dosimeter is thermal-neutron sensitive. Reference 10 reports that 5.9×10^{9} thermal neutrons per cm^2 produce as much acid as 1 rep of gamma rays. During this operation lithium shields in 1/4-inch-thick aluminum "Beer Mugs" were used to reduce the thermal-neutron flux. Page 23 of Reference 51 states, "If no gamma rays are present, 3.25×10^{13} thermal neutrons generate as much acid as 17r of gamma rays in the two-phase tetrachloroethylene system." This is erroneous since it conflicts with statements in Reference 10 by the same author and with Reference 57 which states that 3.25×10^{13} thermal neutrons generate as much acid as 17r of gamma rays when the dosimeter is encased in the lithium shields. Corrections for thermal-neutron effects were not made when the dosimeter was encased in lithium. The chemical dosimeters in the "Beer Mugs" were hung from steel goal posts at approximately 3 feet above the ground.

(U) SRDL exposed film in NBS holders to measure gamma dose. Most of the film was exposed in the photographic-dosimeter transport mechanism (Emmett) designed to measure gamma exposure in one-second increments in the time interval from 0 to 20 seconds. Total dose measurements were obtained inside the Emmett device and from film badges taped to the outside of the Emmett device (1/2 Emmett) and film badges taped to stakes. SRDL did not recommend the use of "betatron correction factors".

(U) Residual radiation values were obtained from Reference 24 for all shots of interest. Most of these residual values were estimates. The residual radiation contribution from each shot for which azimuth and recovery time were reported was determined to be negligible.

(U) The neutron data were obtained by USANDL (Reference 58) and by the Oak Ridge National Laboratory (ORNL) (Reference 55). Reference 55 presents the neutron data in the form of graphs of neutrons per cm^2-times-slant-range-squared versus slant-range, and are subject to interpretive errors. For those shots for which gold-neutron data are missing, the gold-neutron data were estimated from the ratio of gold to plutonium from similar shots.

(U) Reference 58 presents the neutron data in tabular form as well as graphically, thus allowing more precise determination of flux values. Neutron data for Shot Priscilla at distances between 400 and 600 yards were very erratic and did not follow the parallel-line assumption. The placement of the detectors appeared to be the disturbing factor. These detectors were placed among many structures and other installations, which may have caused scattering and other disturbances in the flux field. These measurements, although an indication of the actual flux at the point of measurement, probably did not give a true picture of the free-field flux. For the free-field flux at these distances, the values taken from an extrapolation of the curve obtained from graphing flux-times-slant-range-squared versus slant-range probably give a more realistic figure.

(U) Neutron fluxes from Shot Smoky were obtained to evaluate the effects of terrain on neutron measurements. Since the terrain effects were pronounced, the neutron data can not be extrapolated to distances other than those at which actual measurements were made.

(U) The gamma data corrected, where possible, for neutron effects are presented in Tables 3.93 thru 3.110. The film data reported are taken from NBS film badge measurements unless stated otherwise. Curves of gamma-dose-times-slant-range-squared versus slant-range are shown in Figures 3.64 thru 3.81.

3.12 OPERATION HARDTACK

(U) Operation Hardtack was a two-phase operation: Phase I was conducted at the PPG from May thru August 1958 and consisted of 35 shots which included the first very-high-altitude detonations; Phase II was conducted at the NTS from September thru October 1958 and consisted of 37 shots. A summary of the shot information for the six shots for which initial gamma data are available is presented in Table 3.111. The meteorological conditions at shot time are given in Table 3.112.

(U) (S-RD) Gamma measurements for Shots Fig, Hamilton, and Humboldt were provided by CWL (Reference 59). NBS film badges in steel condulets which were screwed onto steel stakes were the principal detectors used. For Shot Fig, the detector stations were placed as follows: thirty-six film-badge stake stations on land; four Emmett devices on land; eight film-badge stations on land and water along the Project 2.4a neutron line; and seven film-badge stations hung vertically from the Project 2.11 balloon cable. The slant ranges reported for the balloon line are not exact since the position of the cable was estimated. Also, this estimated slant range would apply only for the prompt and nitrogen-capture gamma and not for the fission-product radiation since the fireball and cloud rapidly ascend, and this radiation source would pass within the same distance for each detector. It must also be remembered that the air density decreases with altitude and may affect the gamma results. The 143° line was perpendicular to the long axis of the weapon.

(U) (S-RD) The main gamma instrumentation for Shot Hamilton comprised 96 film-badge stakes and 4 Emmett devices. These data were lost because of an accident during film development. The films used for gamma support measurements for Project 4.2 were undamaged (Reference 60). The 150° and 330° lines were perpendicular to the long axis of the weapon.

(U) (S-RD) Shot Humboldt was unexpectedly moved to another area one day prior to shot day; thus only one line could be instrumented. Film badges in pipe nipples were attached to the neutron line out to 400 yards and were pulled out of the area within 10 minutes after detonation. Farther out, film badges were taped to stakes and goal posts of unknown composition and dimensions. This line was perpendicular to the long axis of the weapons.

(U) (S-RD) Residual contamination was generally negligible. The 30-yard station at Shot Hamilton was in the upwind direction and the dose rate was less than 10 r/hr at H+1 hour. The 30-yard station on the 143° line for Shot Fig was recovered within 5-10 minutes. All the water stations were recovered within 10 minutes. The residual contamination data for Shot Fig were obtained from Reference 61. The H+1-hour readings were used to calculate the total residual dose from 10 minutes to the time of recovery (24 hours).

(U) Neutron data were obtained by CWL for Shots Fig, Hamilton, and Humboldt, and reported in Reference 62.

(U) The gamma and neutron data for Shots Lea, Mora, and Socorro were obtained by ORNL and reported in Reference 63. The gamma dosimeters exposed were tetrachloroethylene chemical dosimeters and $AgPO_4$ glass rods in the ORNL aluminum "Beer Mug" shield including natural lithium shielding. The gamma and neutron data were presented as "normalized" data for Shots X, Y, and Z (Lea, Mora, and Socorro). The appendix to Reference 63 provides the clues necessary to correct the normalized data to actual data for the actual shot. The "scale factors" reported for the neutron data were incorrect. A private communication (Reference 64) from the authors of the report states that the reciprocal of the neutron "scale factors" should be used.

(U) The gamma data are presented in Tables 3.113 thru 3.118. Graphs of gamma-dose-times-slant-range-squared versus slant-range are shown in Figures 3.82 thru 3.87.

3.13 OPERATION SUN BEAM

(U) Operation Sun Beam was conducted at NTS in July 1962. The operation consisted of four shots of small-yield weapons close to the ground. A summary of the shot information is given in Table 3.119, and the meteorological conditions at shot time are presented in Table 3.120.

(U) The USANDL measured the initial gamma dose for the four shots (Reference 11). The detectors used were film in NBS holders, glass microdosimeters in tin-tantalum-teflon holders, cobalt-glass plates, calcium fluoride thermoluminescent dosimeters, and formic-acid chemical dosimeters. The formic-acid dosimeters yielded no usable data and the thermoluminescent dosimeters were generally lower by a factor of three as compared to the other three dosimeter systems. Only a few thermoluminescent dosimeters were exposed, and the results are not presented in this compilation. The dosimeters were exposed mainly in steel pipe nipples which were attached to pull-out recovery lines. No residual radiation corrections are necessary in view of the early recovery of all dosimeters. Protection from thermal neutrons was, in many cases, provided by a shield of lithium-6. The cobalt plates which were not protected by Li^6 yielded data which are suspect since the thermal-neutron correction is very large and not accurately known.

The 649 film data, especially at the closer stations, gave anomalous results after corrections. At some stations the fast-neutron correction was greater than the uncorrected gamma dose. This may be due to an error in the fast-neutron correction factor, but more likely it is due to dose-rate dependence. The 649 film provided much better data at more distant stations where the dose rate was lower, although the neutron-correction factors were the same. Some dosimeters were exposed in nylon pipes with nylon screw-type plugs. The thermal-neutron flux inside these nylon shields was generally higher than the thermal-neutron flux outside the shield by a factor of 2.2. This is taken into account in correcting the data obtained in nylon shields.

(U) The neutron data were obtained by USANDL and reported in Reference 65. Neutron and gamma data were obtained at the same stations. Some of the neutron data points are far removed from the smooth curve of the RD^2 versus D plots. The make-up of the stations may have caused this deviation. The neutron data used are the actual data obtained at each station.

(U) The gamma data are presented in Tables 3.121 thru 3.124. Graphs of gamma-dose-times-slant-range-squared versus slant-range are shown in Figures 3.88 thru 3.93.

3.14 OPERATION FISH BOWL

(U) Operation Fish Bowl was conducted at the Johnson Island Test Area during the summer and fall of 1962. The operation consisted of ten high-altitude detonations, five of which achieved a nuclear yield. Pertinent shot information is presented in Table 3.125.

(U) Gamma measurements were made by USANDL (Reference 64). The main detectors were film in NBS holders, silver-phosphate-glass microdosimeters, and cobalt plates. The gamma instrumentation was contained in three recoverable pods for each shot. The pods were attached to the launch vehicle and released at the proper time during the early part of the trajectory to place them at various distances from the detonation point. The three gamma instrument packages per pod were placed at the center of the pod and were surrounded by various objects and cushioning. Some of the cobalt plates were placed in the neutron-detector packages which were placed at the rear bulkhead and presumably were so oriented that they looked directly at the burst. The cobalt plates in the neutron package recorded less dose than that recorded by the cobalt plates in the gamma package. The greater shielding around the gamma package would indicate that the reverse should be true. However, much of the shielding was a high-hydrogen-content cushioning. This material may have thermalized some of the fast neutrons and provided a higher thermal-neutron flux at the gamma package than at the neutron package. Since the cobalt plates are highly thermal-neutron-sensitive, this thermalization effect may have been the cause of the discrepancy in the readings.

(U) Neutron measurements were made by the USANDL (Reference 65). No thermal-neutron-flux values are given because of the doubtfulness of the validity of the small differences between the cadmium-shielded and the unshielded gold detectors.

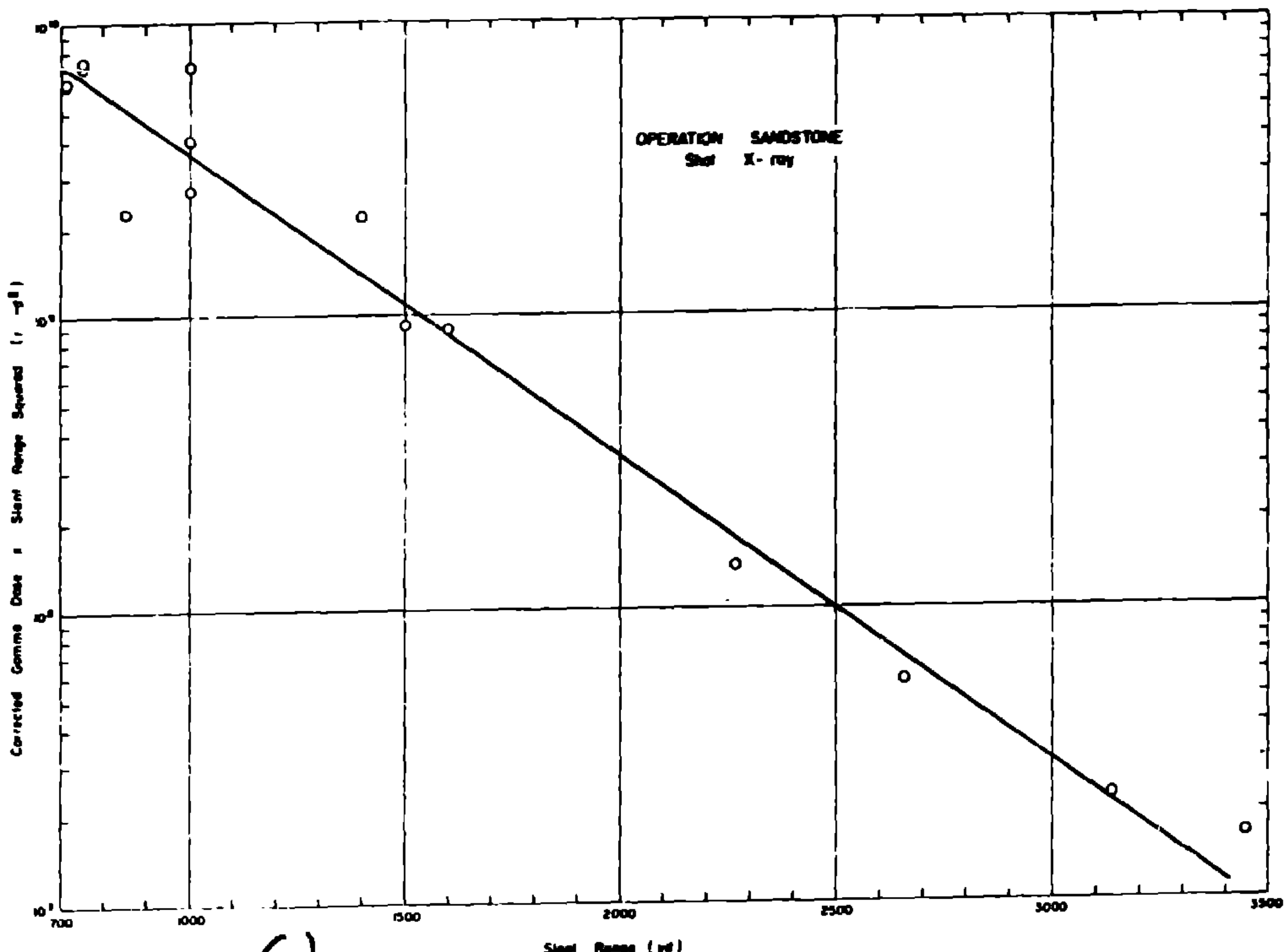
(U) Since the thermal-neutron-flux values are not available, and the effects of the difference in the positioning of the neutron and gamma packages in the pods and the effects of the shielding material are not known, the gamma results have not been corrected for neutron and shielding effects. The uncorrected gamma results are presented in Tables 3.126, 3.127, and 3.128 and the curves of gamma-dose-times-slant-range-squared versus slant-range are shown in Figures 3.94, 3.95 and 3.96.

(S-RD) TABLE 3.1 SHOT INFORMATION - OPERATION SANDSTONE

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield
			ft	kt
X-ray	14 April 1948 1816:59 GMT	Janet-Tower	200	36
Yoke	30 April 1948 1808:59 GMT	Sally-Tower	200	49
Zebra	14 May 1948 1804:60 GMT	Yvonne-Tower	200	18

(U) TABLE 3.2 METEOROLOGICAL DATA - OPERATION SANDSTONE

Shot	Pressure	Temperature	~~Pressure~~ Density	ρ/ρ_s	$(\rho_s/\rho)^2$
	mb	°K	g/cm^{3}x10^3		
X-ray	~~1100~~ 1112.3	297	1.40	1.09	0.85
Yoke	~~1050~~ 1007.3	299	1.23	0.95	1.11
Zebra	~~910~~ 1007.9	300	0.95	0.73	1.88



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(U)

Figure 3.1 (S-RD) Operation Sandstone - Shot X-ray - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

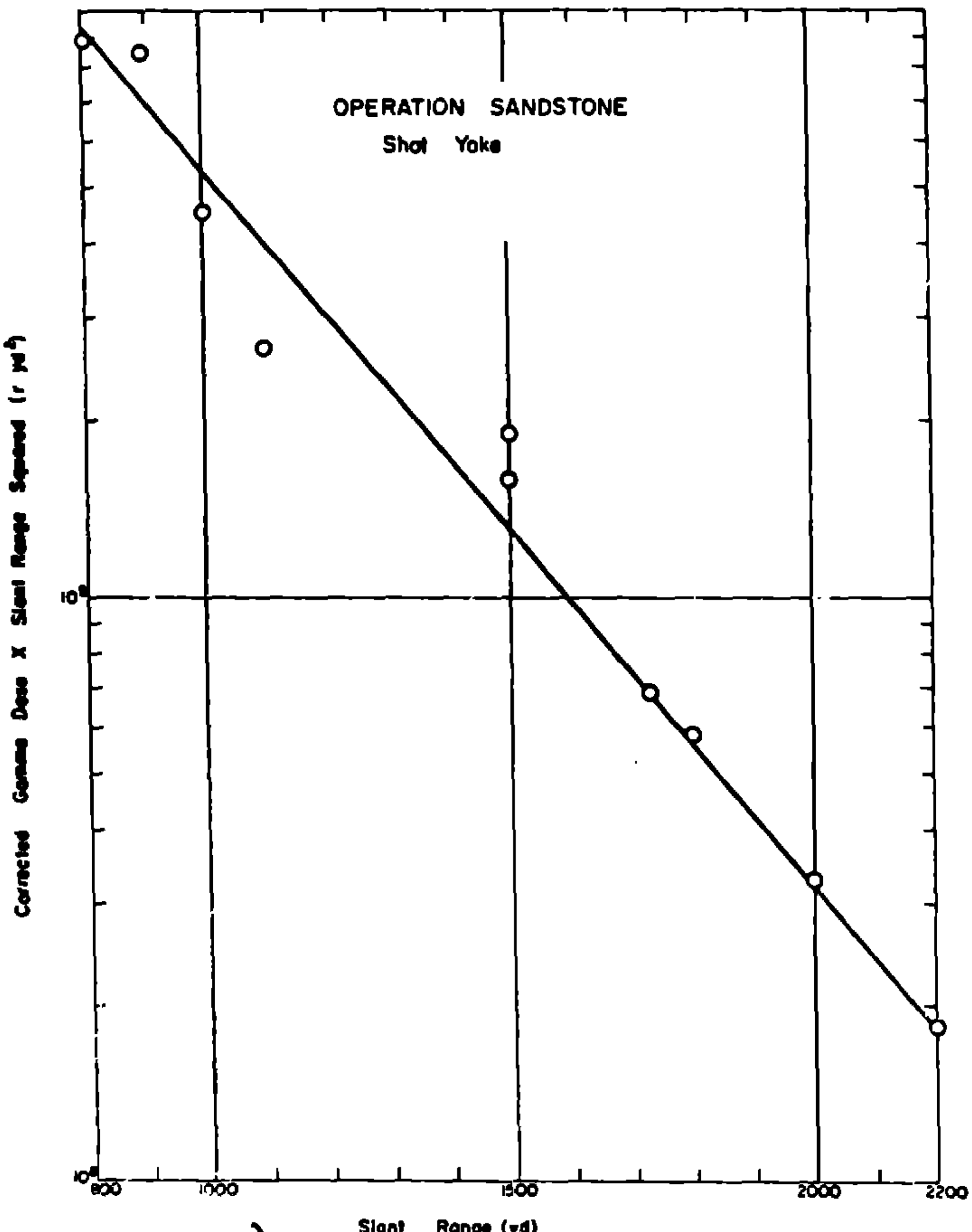

Figure 3.2 (U) ~~(S-RD)~~ Operation Sandstone - Shot Yoke - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

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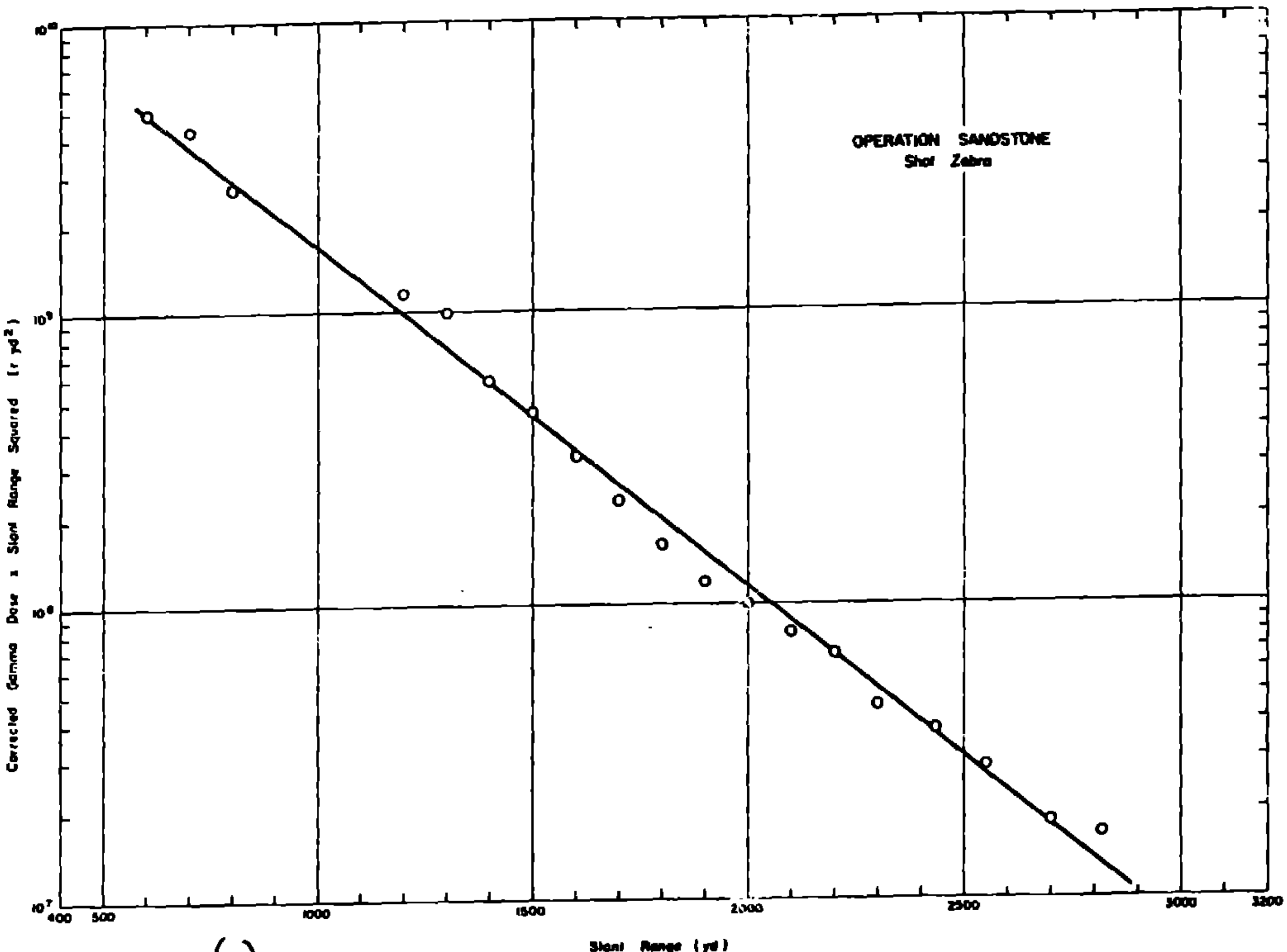


Figure 3.3 ~~(S-RD)~~ (U) Operation Sandstone - Shot Zebra - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) (S-RD) TABLE 3.6 SHOT INFORMATION - OPERATION RANGER

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total	Yield Fission
			ft	kt	kt
Able	27 Jan 1951 1344:51 GMT	FF[a]-Air	1060	1.3	1.3
Baker I	28 Jan 1951 1352:05 GMT	FF[a]-Air	1080	7.4	7.4
Easy	1 Feb 1951 1346:39 GMT	FF[a]-Air	1080	1.	1.
Baker II	2 Feb 1951 1348:48 GMT	FF[a]-Air	1100	7.7	7.7
Fox	6 Feb 1951 1346:55 GMT	FF[a]-Air	1435	22	22

[a]Frenchman's Flat

(U) TABLE 3.7 METEOROLOGICAL DATA - OPERATION RANGER

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^a$
	mb	°K	$g/cm^3 \times 10^3$		
Able	903	271	1.14	0.88	1.29
Baker I	899	270.2	1.14	0.88	1.29
Easy	919	261.5	1.21	0.93	1.16
Baker II	883	263.8	1.14	0.88	1.29
Fox	909	271	1.14	0.88	1.29

(U) TABLE 3.8 INITIAL GAMMA DOSE DATA - OPERATION RANGER, SHOT ABLE

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: S	Shield Type
yd			r	n/cm^2	n/cm^2	
300	c	Adlux	<3,000	7.37×10^{11}	d	e
[illegible]	c	Adlux	<3,000	[illegible]	d	e
450	c	Adlux	1,910	[illegible]	d	e
510	c	Adlux	870	[illegible]	d	e
570	c	Adlux	[illegible]	[illegible]	d	e
670	c	Adlux	410	1.49×10^{10}	d	e
760	c	Adlux	270	[illegible]	d	e
850	c	Adlux	165	3.87×10^{9}	d	e
940	c	Adlux	120	2.07×10^{9}	d	e
1,030	c	Adlux	78	1.03×10^{9}	d	e
1,130	c	552^a	49	[illegible]	d	e
1,220	c	552^a	[illegible]	[illegible]	d	e
1,320	c	552^a	23	1.22×10^{8}	d	e
1,420	c	552^a	16	5.84×10^{7}	d	e
1,510	c	552^a	11.1	2.98×10^{7}	d	e
1,810	c	552^a, 552^b	4.0	3.34×10^{6}	d	e
1,900	c	552^a, 552^b	2.9	1.74×10^{6}	d	e
2,000	c	552^a, 552^b	1.9	8.26×10^{5}	d	e
2,100	c	552^a, 552^b	1.4	3.97×10^{5}	d	e
2,200	c	552^a, 552^b	1.1	1.91×10^{5}	d	e
2,300	c	552^b	0.76	9.14×10^{4}	d	e
2,400	c	552^b	0.53	4.38×10^{4}	d	e
2,500	c	552^b	0.40	2.12×10^{4}	d	e
2,600	c	552^b	0.29	1.02×10^{4}	d	e
2,700	c	552^b	0.23	4.91×10^{3}	d	e
2,800	c	552^b	0.16	2.39×10^{3}	d	e
2,900	c	552^b	0.11	$<1\times10^{3}$	d	e
3,000	c	552^b	0.09	$<1\times10^{3}$	d	e
370	f	Adlux	<3,000	5.72×10^{11}	d	e
410	f	Adlux	2,045	2.79×10^{11}	d	e
470	f	Adlux	1,185	1.14×10^{11}	d	e
540	f	Adlux	760	4.02×10^{10}	d	e
620	f	Adlux	480	2.20×10^{10}	d	e
710	f	Adlux	340	1.10×10^{10}	d	e
800	f	Adlux	225	5.65×10^{9}	d	e
890	f	Adlux	145	2.92×10^{9}	d	e
980	f	Adlux	95	1.40×10^{9}	d	e
1,070	f	Adlux	65	6.67×10^{8}	d	e
1,170	f	Adlux	42	3.69×10^{8}	d	e
1,260	f	552^a, Adlux	28	1.91×10^{8}	d	e
1,360	f	552^a	19	9.43×10^{7}	d	e
1,460	f	552^a	15	4.38×10^{7}	d	e
1,550	f	552^a	10.9	2.24×10^{7}	d	e
1,650	f	552^a, 552^b	7.1	1.07×10^{7}	d	e
1,750	f	552^a, 552^b	[illegible]	5.21×10^{6}	d	e
1,850	f	552^a, 552^b	3.7	2.50×10^{6}	d	e
1,940	f	552^a, 552^b	2.6	1.28×10^{6}	d	e
2,040	f	552^a, 552^b	1.9	6.22×10^{5}	d	e
2,140	f	552^a, 552^b	[illegible]	2.95×10^{5}	d	e
2,240	f	552^a, 552^b	0.97	1.42×10^{5}	d	e
2,340	f	552^b	0.7	6.71×10^{4}	d	e
2,440	f	552^b	[illegible]	3.25×10^{4}	d	e
2,540	f	552^b	[illegible]	1.55×10^{4}	d	e
2,640	f	552^b	[illegible]	7.59×10^{3}	d	e
2,730	f	552^b	[illegible]	3.74×10^{3}	d	e
2,830	f	552^b	[illegible]	1.91×10^{3}	d	e
2,930	f	552^b	0.1	$<1\times10^{3}$	d	e
3,030	f	552	0.09	$<1\times10^{3}$	d	e

[a] Insensitive.
[b] Sensitive.
[c] [illegible]
[d] No sulfur exposed.
[e] [illegible] attached to angle-iron stake.

(U) TABLE 3.9 INITIAL GAMMA DOSE DATA - OPERATION RANGER, SHOT BAKER 1

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: S	Shield Type
yd			r	n/cm^2	n/cm^2	
720	c	Adlux	>3,000	[illegible]	d	e
800	c	Adlux	1,850	3.48×10^{10}	d	e
890	c	Adlux	1,045	1.80×10^{10}	d	e
990	c	Adlux	730	1.00×10^{10}	d	e
1,090	c	Adlux	450	4.42×10^{9}	d	e
1,170	c	Adlux	340	2.51×10^{9}	d	e
1,270	c	Adlux	235	1.25×10^{9}	d	e
1,360	c	Adlux	160	6.73×10^{8}	d	e
1,460	c	Adlux	110	[illegible]	d	e
1,560	c	Adlux	71	1.64×10^{8}	d	e
1,660	c	Adlux	[illegible]	[illegible]	d	e
1,750	c	Adlux	37	4.31×10^{7}	d	e
1,850	c	552^a, Adlux	[illegible]	2.11×10^{7}	d	e
1,950	c	552^a, Adlux	18	1.06×10^{7}	d	e
2,050	c	552^a	[illegible]	5.17×10^{6}	d	e
2,150	c	552^a	[illegible]	2.55×10^{6}	d	e
2,240	c	552^a, 552^b	6.3	1.35×10^{6}	d	e
2,340	c	552^a, 552^b	4.8	6.73×10^{5}	d	e
2,440	c	552^a, 552^b	3.4	3.37×10^{5}	d	e
2,540	c	552^a, 552^b	2.4	1.66×10^{5}	d	e
2,640	c	552^a, 552^b	1.8	8.30×10^{4}	d	e
2,740	c	552^a, 552^b	1.4	4.11×10^{4}	d	e
2,840	c	552^a, 552	[illegible]	2.05×10^{4}	d	e
2,940	c	552^b	[illegible]	1.02×10^{4}	d	e
3,040	c	552^b	0.56	$<1\times10^{4}$	d	e
3,140	c	552^b	0.37	$<1\times10^{4}$	d	e
3,230	c	552^b	0.31	$<1\times10^{4}$	d	e
3,330	c	552^b	[illegible]	$<1\times10^{4}$	d	e
3,430	c	552^b	0.17	$<1\times10^{4}$	d	e
700	f	Adlux	<3,000	[illegible]	d	e
790	f	Adlux	[illegible]	[illegible]	d	e
890	f	Adlux	[illegible]	1.94×10^{10}	d	e
970	f	Adlux	845	1.00×10^{10}	d	e
1,060	f	Adlux	440	5.52×10^{9}	d	e
1,160	f	Adlux	340	2.68×10^{9}	d	e
1,250	f	Adlux	225	1.44×10^{9}	d	e
1,350	f	Adlux	165	7.20×10^{8}	d	e
1,440	f	Adlux	110	3.80×10^{8}	d	e
1,540	f	Adlux	77	1.89×10^{8}	d	e
1,640	f	Adlux	54	9.40×10^{7}	d	e
1,740	[illegible]	[illegible]	[illegible]	4.66×10^{7}	d	e
1,830	[illegible]	[illegible], Adlux	[illegible]	2.43×10^{7}	d	e
1,930	f	[illegible], Adlux	[illegible]	1.22×10^{7}	d	e
2,010	[illegible]	[illegible]	[illegible]	5.95×10^{6}	d	e
2,130	[illegible]	[illegible]	[illegible]	2.76×10^{6}	d	e
2,230	[illegible]	[illegible], 552^b	[illegible]	1.47×10^{6}	d	e
2,330	[illegible]	[illegible]	[illegible]	7.20×10^{5}	d	e
[illegible]	f	[illegible]	[illegible]	[illegible]	d	e
2,520	f	[illegible]	[illegible]	1.93×10^{5}	d	e
2,620	f	[illegible]	[illegible]	9.47×10^{4}	d	e
2,720	f	[illegible]	[illegible]	4.70×10^{4}	d	e
2,820	f	[illegible], 552^b	0.97	2.35×10^{4}	d	e
2,920	f	552^b	0.71	1.17×10^{4}	d	e
3,020	f	552^b	[illegible]	$<1\times10^{4}$	d	e
3,120	f	552^b	[illegible]	$<1\times10^{4}$	d	e
3,220	f	552^b	[illegible]	$<1\times10^{4}$	d	e
3,320	f	552^b	[illegible]	$<1\times10^{4}$	d	e
3,420	f	552^b	0.17	$<1\times10^{4}$	d	e

[a] Insensitive.
[b] Sensitive.
[c] [illegible]
[d] No sulfur exposed.
[e] [illegible] attached to angle-iron stake.
[f] [illegible]

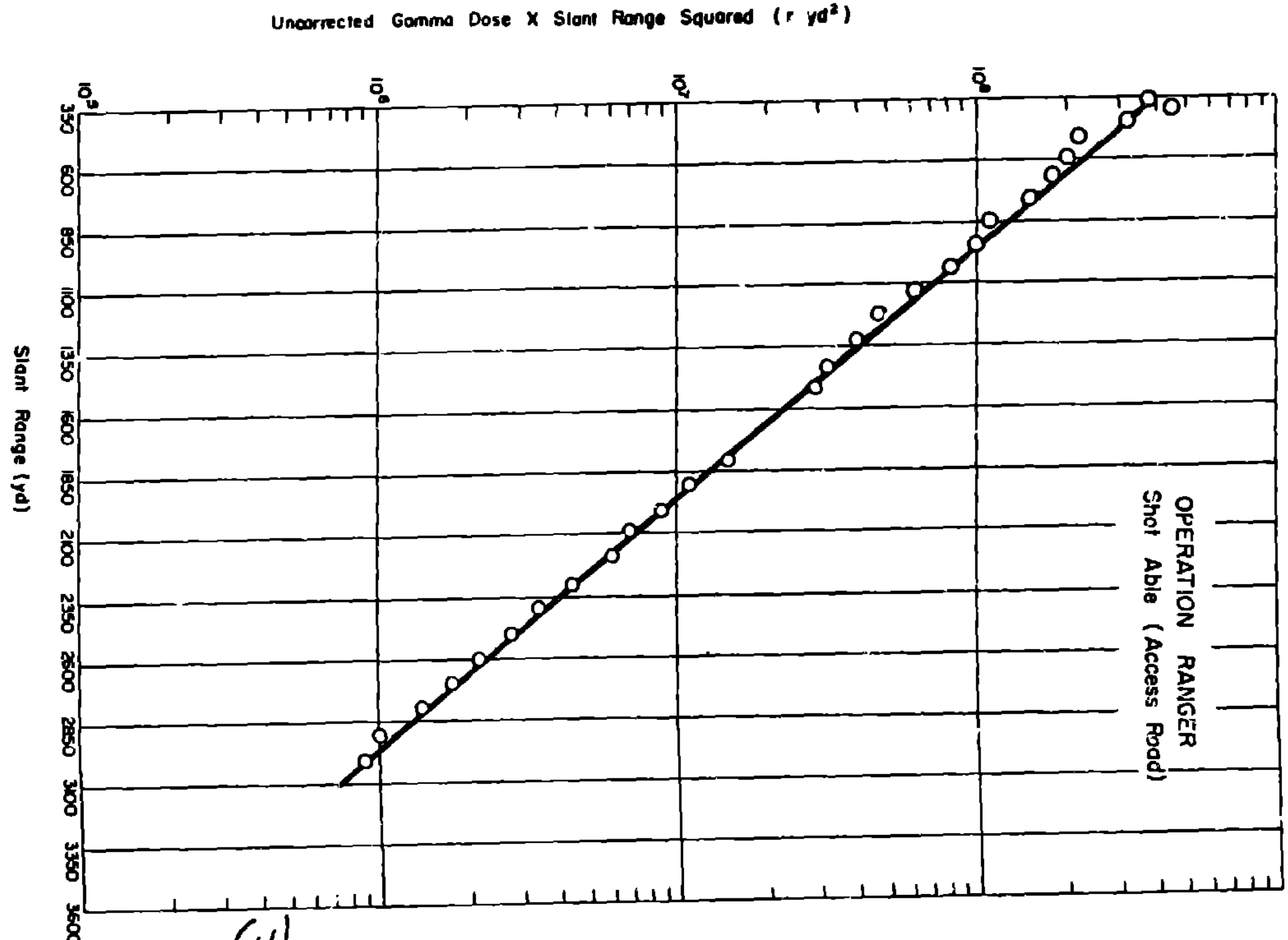


Figure 3.4-(S-RD) (U) Operation Ranger - Shot Able (Access Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

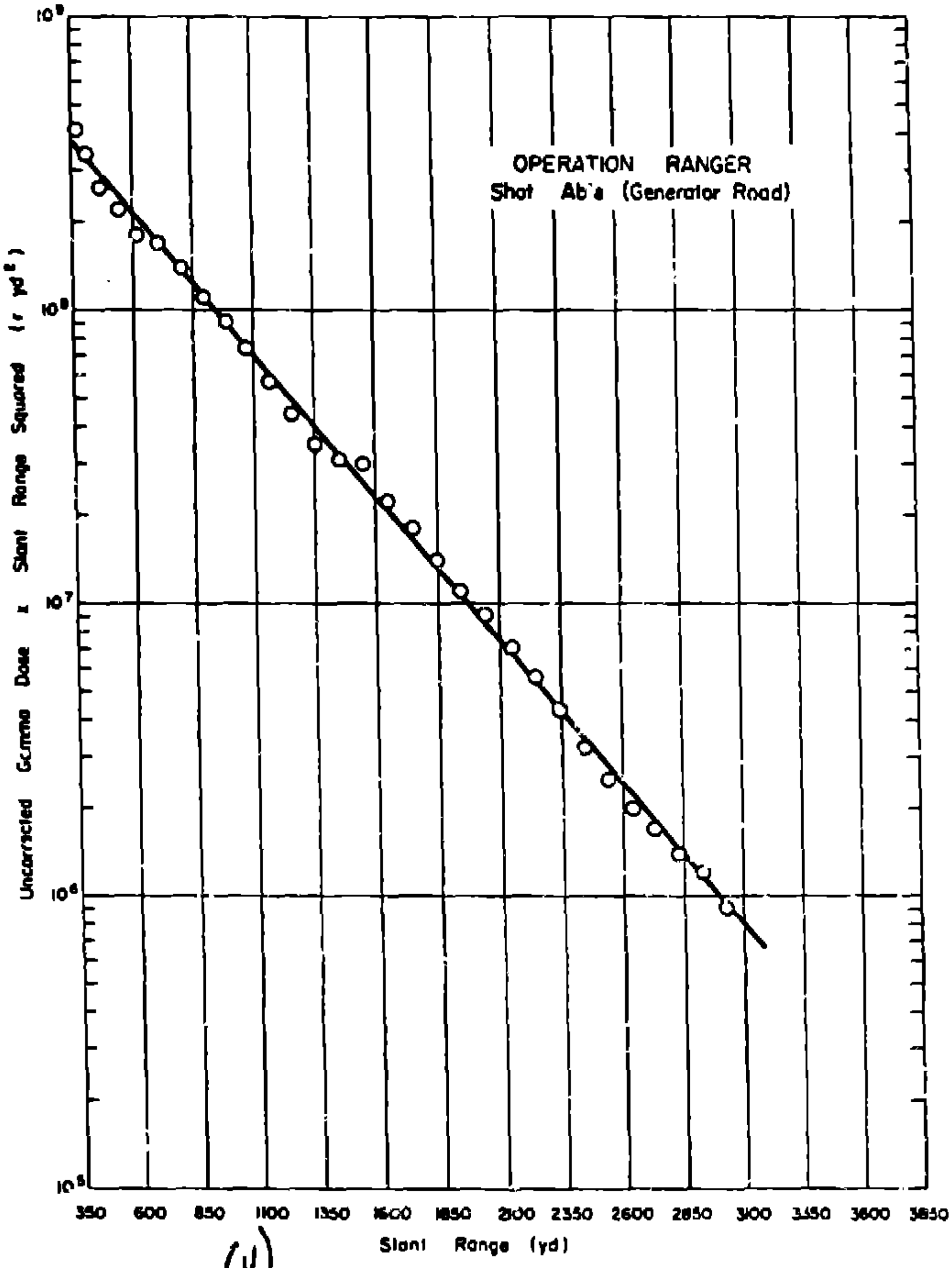
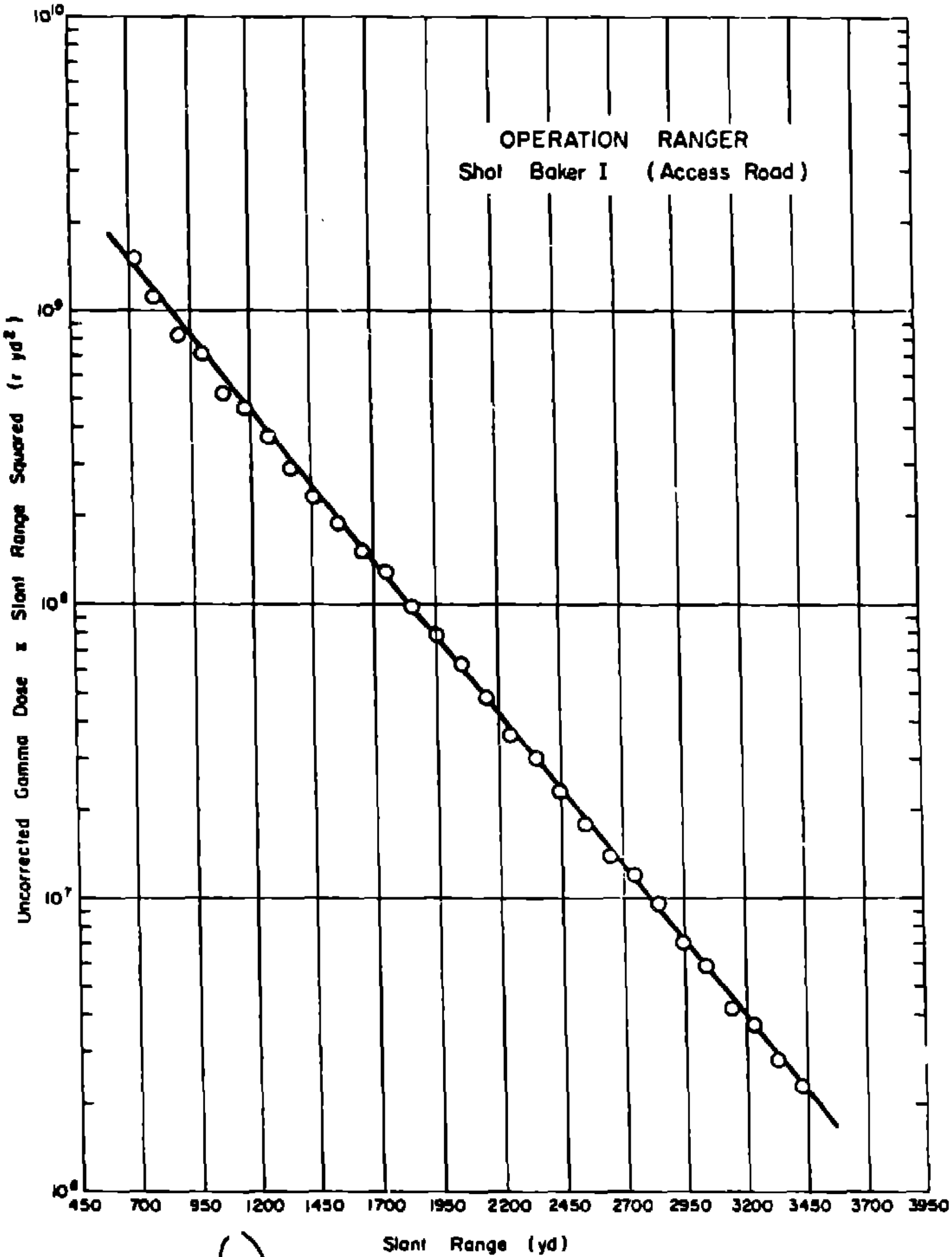


Figure 3.5 (U) ~~(S-RD)~~ Operation Ranger - Shot Able (Generator Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).



(U)

Figure 3.6 ~~(S-RD)~~ Operation Ranger - Shot Baker I (Access Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

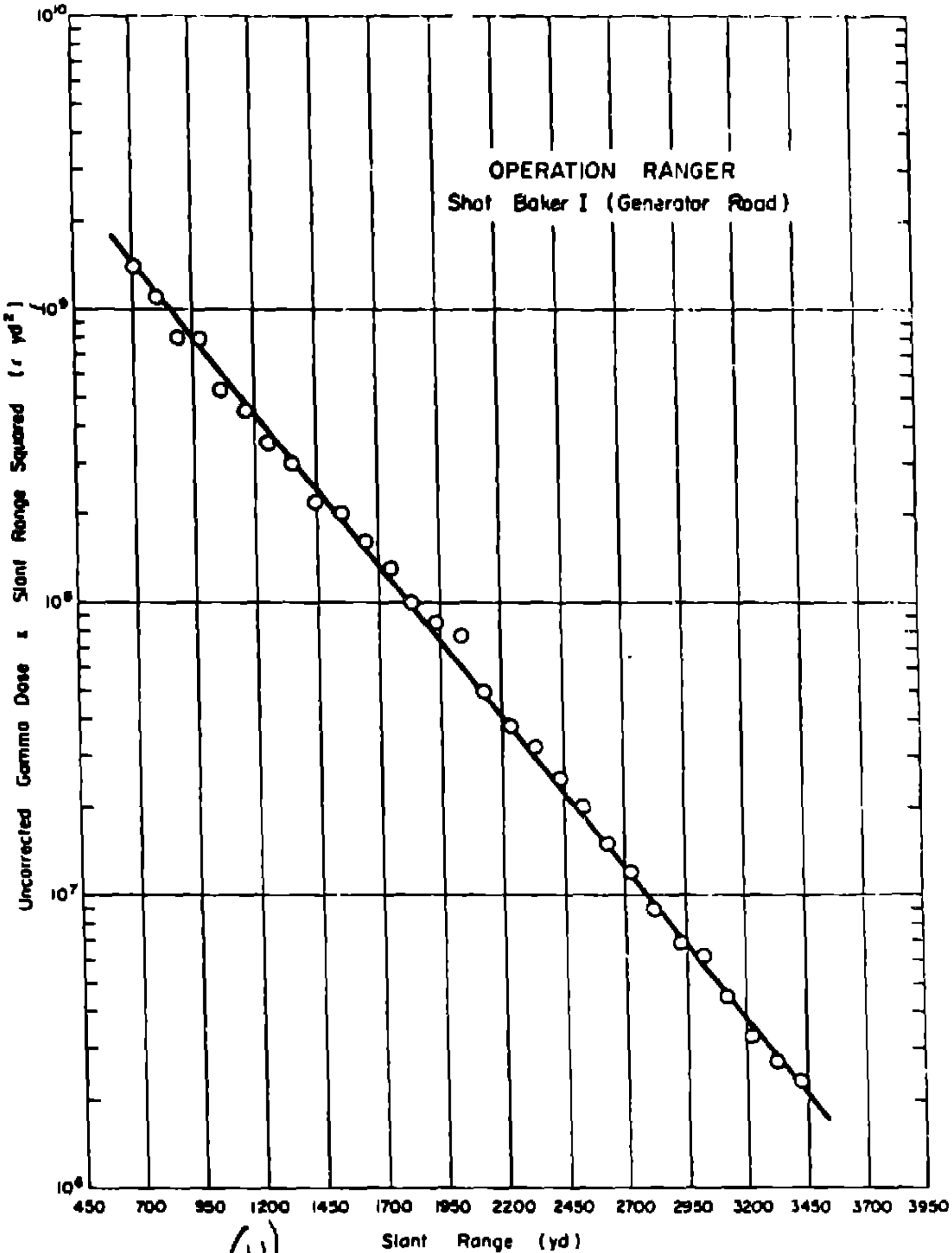


Figure 3.7 (~~S-RD~~ U) Operation Ranger - Shot Baker I (Generator Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range(U).

TABLE 3.10 INITIAL GAMMA DOSE DATA - OPERATION HARDTACK, SHOT LACY

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
yd			r	n/cm²	n/cm²	
370	c	Adlux	1,670	4.50×10^{11}	d	e
420	c	Adlux	1,175	1.77×10^{11}	d	e
470	c	Adlux	775	[illegible]	d	e
540	c	Adlux	625	[illegible]	d	e
620	c	Adlux	400	[illegible]	d	e
700	c	Adlux	290	[illegible]	d	e
790	c	Adlux	185	2.70×10^{9}	d	e
850	c	Adlux	125	1.45×10^{9}	d	e
970	c	Adlux	87	7.40×10^{8}	d	e
1,070	c	Adlux	52	[illegible]	d	e
1,160	c	552^a, Adlux	35	[illegible]	d	e
1,260	c	552^a, do	20	9.70×10^{7}	d	e
1,350	c	552^a	15	4.00×10^{7}	d	e
1,450	c	552^a	11.0	2.20×10^{7}	d	e
1,550	c	552^a, 552^b	[illegible]	[illegible]	d	e
1,640	c	552^a, 552^b	4.6	5.00×10^{6}	d	e
1,740	c	552^a, 552^b	3.2	2.70×10^{6}	d	e
1,840	c	552^a, 552^b	[illegible]	1.30×10^{6}	d	e
1,940	c	552^a, 552^b	1.65	6.25×10^{5}	d	e
2,030	c	552^a, 552^b	1.17	[illegible]	d	e
2,130	c	552^b	0.80	[illegible]	d	e
2,230	c	552^b	0.65	7.60×10^{4}	d	e
2,330	c	552^b	0.50	[illegible]	d	e
2,430	c	552^b	[illegible]	[illegible]	d	e
2,530	c	552^b	[illegible]	[illegible]	d	e
2,630	c	552^b	0.17	[illegible]	d	e
2,730	c	552^b	0.13	[illegible]	d	e
390	r	Adlux	1,740	3.40×10^{11}	d	e
440	r	Adlux	1,280	1.20×10^{11}	d	e
500	r	Adlux	905	4.70×10^{10}	d	e
560	r	Adlux	565	1.75×10^{10}	d	e
600	r	Adlux	340	7.80×10^{9}	d	e
750	r	Adlux	245	3.05×10^{9}	d	e
840	r	Adlux	160	1.93×10^{9}	d	e
930	r	Adlux	98	1.00×10^{9}	d	e
1,020	r	Adlux	64	5.10×10^{8}	d	e
1,120	r	552^a, Adlux	39	2.49×10^{8}	d	e
1,210	r	552^a, Adlux	25	1.28×10^{8}	d	e
1,300	r	552^a, Adlux	20	6.70×10^{7}	d	e
1,400	r	552^a	[illegible]	[illegible]	d	e
1,500	r	552^a	10.5	[illegible]	d	e
1,600	r	552^a, 552^b	5.7	7.50×10^{6}	d	e
1,700	r	552^a, 552^b	4.3	3.05×10^{6}	d	e
1,800	r	552^a, 552^b	2.7	1.72×10^{6}	d	e
1,900	r	552^a, 552^b	2.1	8.15×10^{5}	d	e
2,100	r	552^a, 552^b	1.0	[illegible]	d	e
2,200	r	552^b	[illegible]	9.45×10^{4}	d	e
2,300	r	552^b	0.53	[illegible]	d	e
2,400	r	552^b	0.47	[illegible]	d	e
2,500	r	552^b	[illegible]	[illegible]	d	e
2,600	r	552^b	[illegible]	[illegible]	d	e
2,700	r	552^b	[illegible]	[illegible]	d	e

a Insensitive.
b Sensitive.
[illegible]

TABLE 3.11 INITIAL GAMMA DOSE DATA - OPERATION HARDTACK, SHOT HARDTACK II

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
yd			r	n/cm²	n/cm²	
740	c	Adlux	1,975	6.28×10^{10}	d	e
820	c	Adlux	1,160	3.14×10^{10}	d	e
910	c	Adlux	860	1.51×10^{10}	d	e
1,000	c	Adlux	[illegible]	8.59×10^{9}	d	e
1,100	c	Adlux	350	4.21×10^{9}	d	e
1,190	c	Adlux	245	2.23×10^{9}	d	e
1,280	c	Adlux	155	1.13×10^{9}	d	e
1,380	c	Adlux	105	5.57×10^{8}	d	e
1,480	c	Adlux	[illegible]	2.74×10^{8}	d	e
1,570	c	Adlux	[illegible]	1.43×10^{8}	d	e
1,670	c	552^a, Adlux	35	6.92×10^{7}	d	e
1,770	c	552^a, Adlux	[illegible]	3.42×10^{7}	d	e
1,860	c	552^a, Adlux	[illegible]	1.80×10^{7}	d	e
1,960	c	552^a	13.6	[illegible]	d	e
2,060	c	552^a, 552^b	[illegible]	4.29×10^{6}	d	e
2,160	c	552^a, 552^b	6.2	2.06×10^{6}	d	e
2,260	c	552^a, 552^b	4.5	1.03×10^{6}	d	e
2,350	c	552^a, 552^b	3.3	5.41×10^{5}	d	e
2,450	c	552^a, 552^b	2.4	2.66×10^{5}	d	e
2,550	c	552^a, 552^b	1.61	1.27×10^{5}	d	e
2,650	c	552^a, 552^b	1.24	[illegible]	d	e
2,750	c	552^a, 552^b	0.93	3.10×10^{4}	d	e
2,850	c	552^b	[illegible]	1.58×10^{4}	d	e
2,950	c	552^b	0.45	7.71×10^{3}	d	e
3,050	c	552^b	0.3	$<1\times10^{3}$	d	e
3,150	c	552^b	0.25	$<1\times10^{3}$	d	e
3,250	c	552^b	0.19	$<1\times10^{3}$	d	e
760	r	Adlux	1,680	5.09×10^{10}	d	e
850	r	Adlux	1,060	2.54×10^{10}	d	e
940	r	Adlux	715	1.33×10^{10}	d	e
1,030	r	Adlux	445	6.84×10^{9}	d	e
1,130	r	Adlux	325	3.38×10^{9}	d	e
1,220	r	Adlux	225	1.76×10^{9}	d	e
1,320	r	Adlux	155	8.54×10^{8}	d	e
1,410	r	Adlux	100	4.49×10^{8}	d	e
1,510	r	Adlux	[illegible]	[illegible]	d	e
1,610	r	Adlux	[illegible]	1.07×10^{8}	d	e
1,700	r	552^a, Adlux	[illegible]	[illegible]	d	e
1,800	r	552^a, Adlux	[illegible]	2.78×10^{7}	d	e
1,900	r	552^a	[illegible]	[illegible]	d	e
2,000	r	552^a	10.4	[illegible]	d	e
2,100	r	552^a, 552^b	7.7	[illegible]	d	e
[illegible]	r	552^a, 552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^a, 552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^a, 552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^a, 552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^a, 552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^a, 552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^b	[illegible]	[illegible]	d	e
3,000	r	552^b	[illegible]	[illegible]	d	e
[illegible]	r	552^b	0.22	[illegible]	d	e
[illegible]	r	552^b	[illegible]	[illegible]	d	e

a Insensitive.
b Sensitive.
[illegible]
... attached to angle-iron stake.

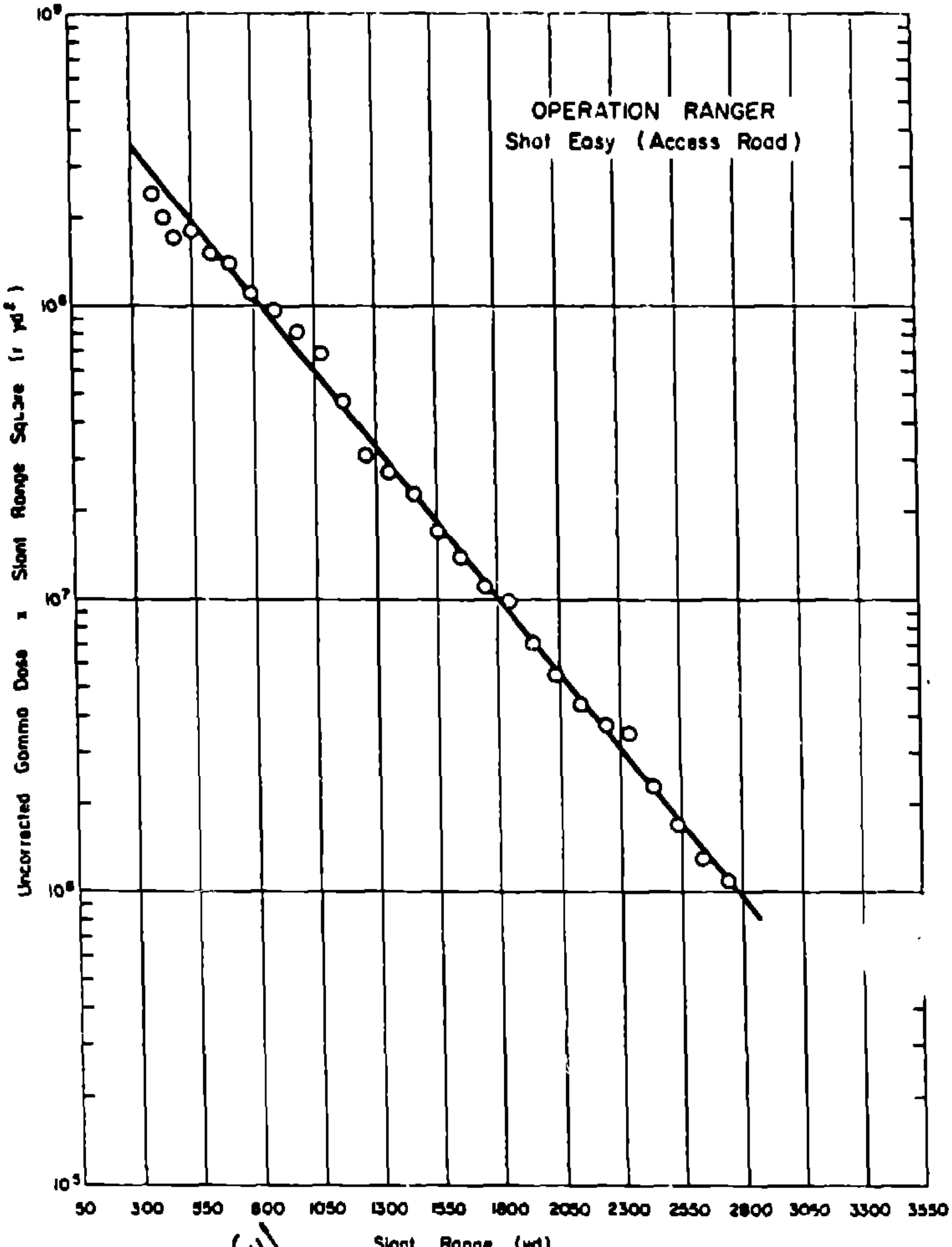


Figure 3.8 (U) ~~(S-RD)~~ Operation Ranger - Shot Easy (Access Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range(U).

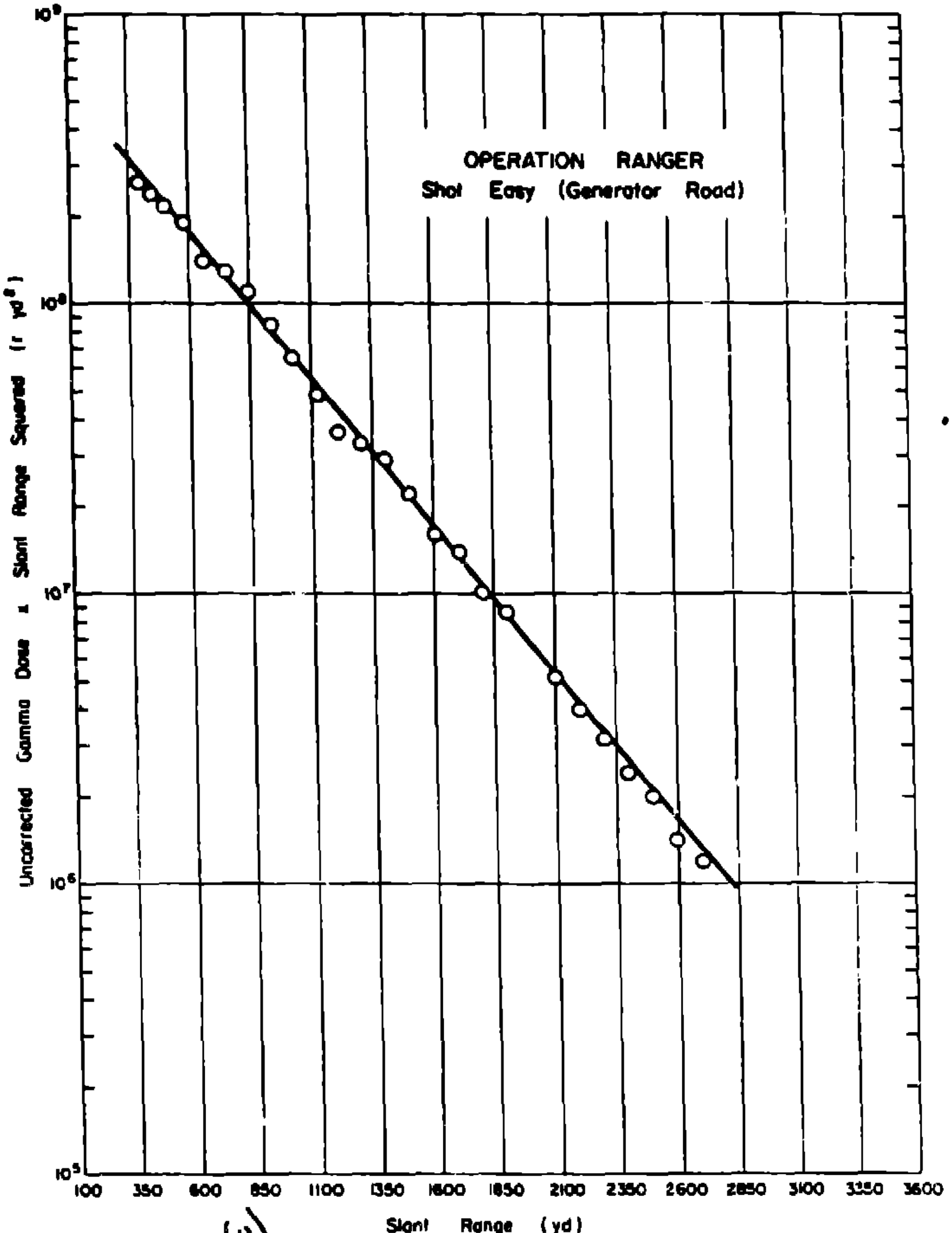


Figure 3.9 (U) ~~(S-RD)~~ Operation Ranger - Shot Easy (Generator Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

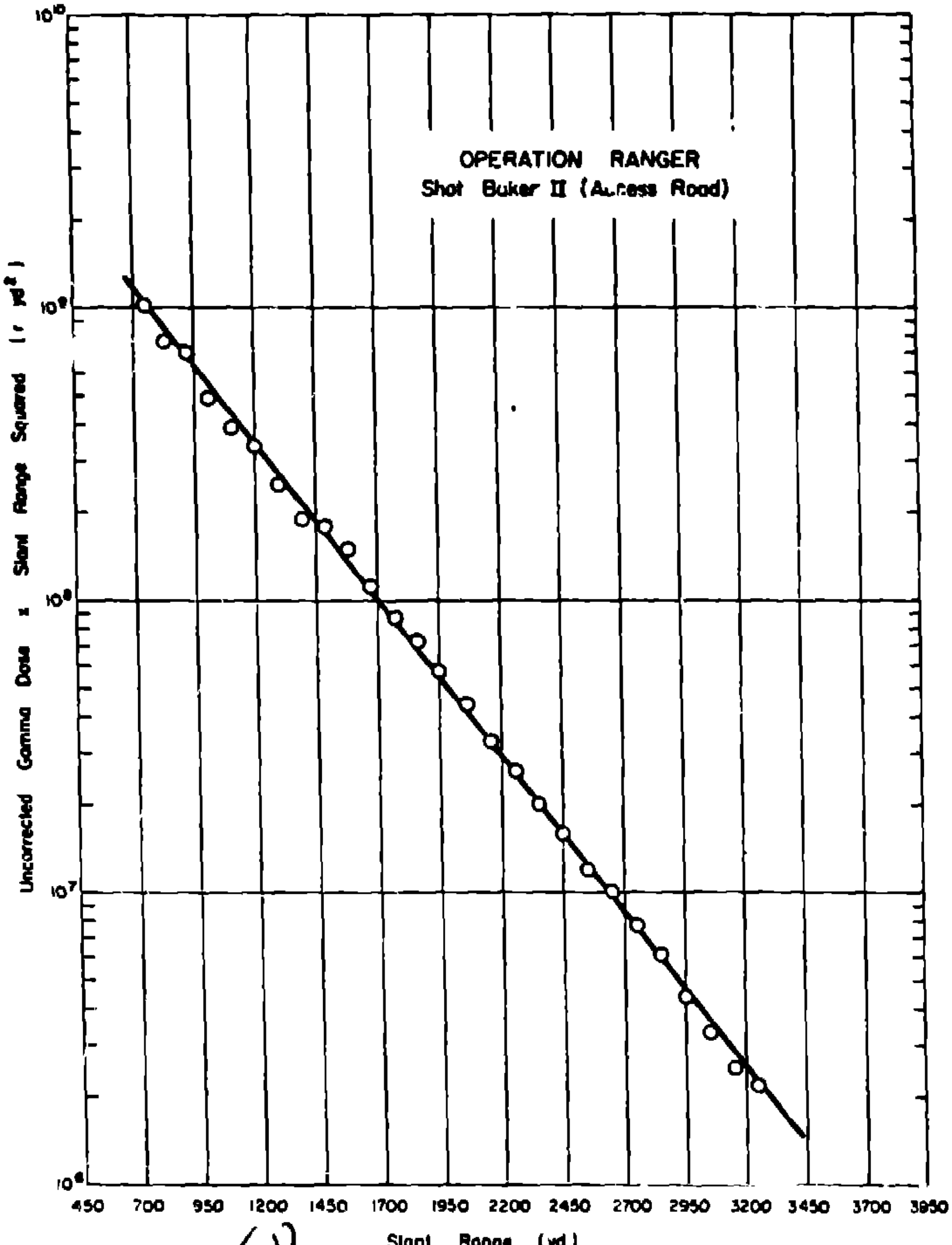
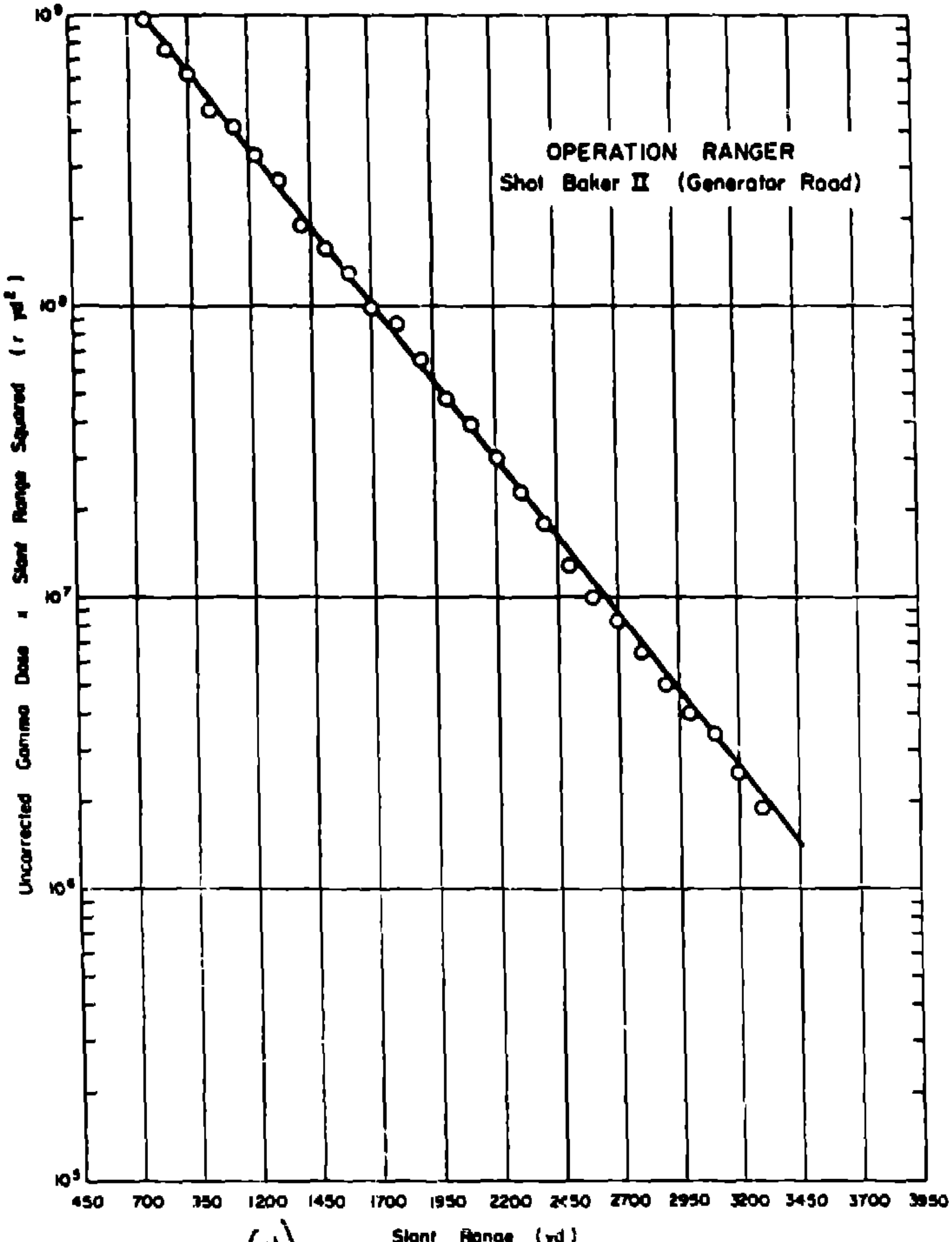


Figure 3.10 (~~S-RD~~) (U) Operation Ranger - Shot Baker II (Access Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range(U).



(U)

Figure 3.11 ~~(S-RD)~~ Operation Ranger - Shot Baker II (Generator Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

(U) TABLE 3.1[illegible] INITIAL GAMMA [illegible] OPERATION [illegible], [illegible]

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
yd			r	n/cm²	n/cm²	
1,000	c	Adlux	2,600	5.11x10^[illegible]	d	e
1,060	c	Adlux	1,830	4.00x10^[illegible]	d	e
1,150	c	Adlux	1,300	1.0[illegible]x10^[illegible]	d	e
1,270	c	Adlux	775	9.[illegible]x10^[illegible]	d	e
1,370	c	Adlux	480	5.[illegible]x10^[illegible]	d	e
1,460	c	Adlux	375	3.00x10^[illegible]	d	e
1,560	c	Adlux	[illegible]	1.64x10^[illegible]	[illegible]	e
1,650	c	Adlux	[illegible]	9.55x10^[illegible]	d	e
1,750	c	Adlux	11[illegible]	5.15x10^[illegible]	d	e
1,840	c	Adlux	77	2.9[illegible]x10^[illegible]	d	e
1,940	c	Adlux	[illegible]	1.61x10^[illegible]	d	e
2,040	c	Adlux	[illegible]	8.77x10^[illegible]	d	e
2,130	c	552[a], Adlux	[illegible]	5.11x10^[illegible]	d	e
2,230	c	552[a], Adlux	[illegible]	2.70x10^[illegible]	d	e
2,330	c	552[a]	16.[illegible]	1.51x10^[illegible]	d	e
2,430	c	552[a]	11.0	8.21x10^[illegible]	d	e
2,530	c	552[a]	9.[illegible]	4.[illegible]x10^[illegible]	d	e
2,620	c	552[a], 552[b]	[illegible]	2.60x10^[illegible]	d	e
2,720	c	552[a], 552[b]	[illegible]	1.40x10^[illegible]	d	e
[illegible]	c	552[a], 552[b]	[illegible]	7.77x10^[illegible]	d	e
[illegible]	c	552[a], 552[b]	[illegible]	4.[illegible]x10^[illegible]	d	e
[illegible]	c	552[a], 552[b]	[illegible]	2.[illegible]x10^[illegible]	d	e
3,120	c	552[a], 552[b]	1.[illegible]	[illegible]x10^[illegible]	d	e
3,220	c	552[a], 552[b]	1.0	[illegible]x10^[illegible]	d	e
3,310	c	552[b]	0.71	[illegible]x10^[illegible]	d	e
3,410	c	552[b]	[illegible]	1.[illegible]x10^[illegible]	[illegible]	e
[illegible]	c	552[b]	[illegible]	<[illegible]x10^[illegible]	d	e
[illegible]	c	552[b]	[illegible]	[illegible]	d	e
[illegible]	c	552[b]	[illegible]	<[illegible]x10^[illegible]	d	e
3,710	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(U) TABLE 3.1[illegible] (CONTINUED)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
yd			r	n/cm²	n/cm²	
1,000	r	Adlux	2,600	5.11x10^[illegible]	d	e
1,080	r	Adlux	1,650	3.11x10^[illegible]	d	e
1,170	r	Adlux	1,045	1.70x10^[illegible]	d	e
[illegible]	r	Adlux	[illegible]	1.0[illegible]x10^[illegible]	d	e
1,350	r	Adlux	[illegible]	5.88x10^[illegible]	d	e
1,450	r	Adlux	[illegible]	3.17x10^[illegible]	d	e
1,540	r	Adlux	[illegible]	1.[illegible]x10^[illegible]	d	e
1,630	r	Adlux	[illegible]	1.0[illegible]x10^[illegible]	d	e
1,730	r	Adlux	1[illegible]	5.[illegible]x10^[illegible]	d	e
1,820	r	Adlux	[illegible].5	3.[illegible]x10^[illegible]	d	e
1,920	r	Adlux	[illegible]	1.8[illegible]x10^[illegible]	d	e
2,020	r	Adlux	[illegible]	9.[illegible]x10^[illegible]	d	e
2,120	r	552[a], Adlux	[illegible]	5.[illegible]x10^[illegible]	d	e
2,210	r	552[a]	[illegible]	1.11x10^[illegible]	d	e
2,310	r	552[a]	[illegible]	1.[illegible]x10^[illegible]	d	e
2,400	r	552[a]	[illegible]	9.77x10^[illegible]	d	e
2,500	r	552[a]	[illegible]	5.[illegible]x10^[illegible]	d	e
2,600	r	552[a], 552[b]	[illegible]	2.9[illegible]x10^[illegible]	d	e
2,700	r	552[a], 552[b]	[illegible]	1.5[illegible]x10^[illegible]	d	e
2,800	r	552[a], 552[b]	[illegible]	8.[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	[illegible]	[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	[illegible]	2.71x10^[illegible]	d	e
3,090	r	552[a], 552[b]	[illegible]	1.47x10^[illegible]	d	e
3,190	r	552[a], 552[b]	[illegible]	7.[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	0.[illegible]	4.[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	[illegible]	2.[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	[illegible]	1.[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	[illegible]	<[illegible]x10^[illegible]	d	e
[illegible]	r	552[a], 552[b]	[illegible]	[illegible]x10^[illegible]	d	e

[a] [illegible]
[b] [illegible]
[c] [illegible]
[d] No sulfur exposed.
[e] [illegible] holders attached to angle-iron stake.
[f] [illegible]

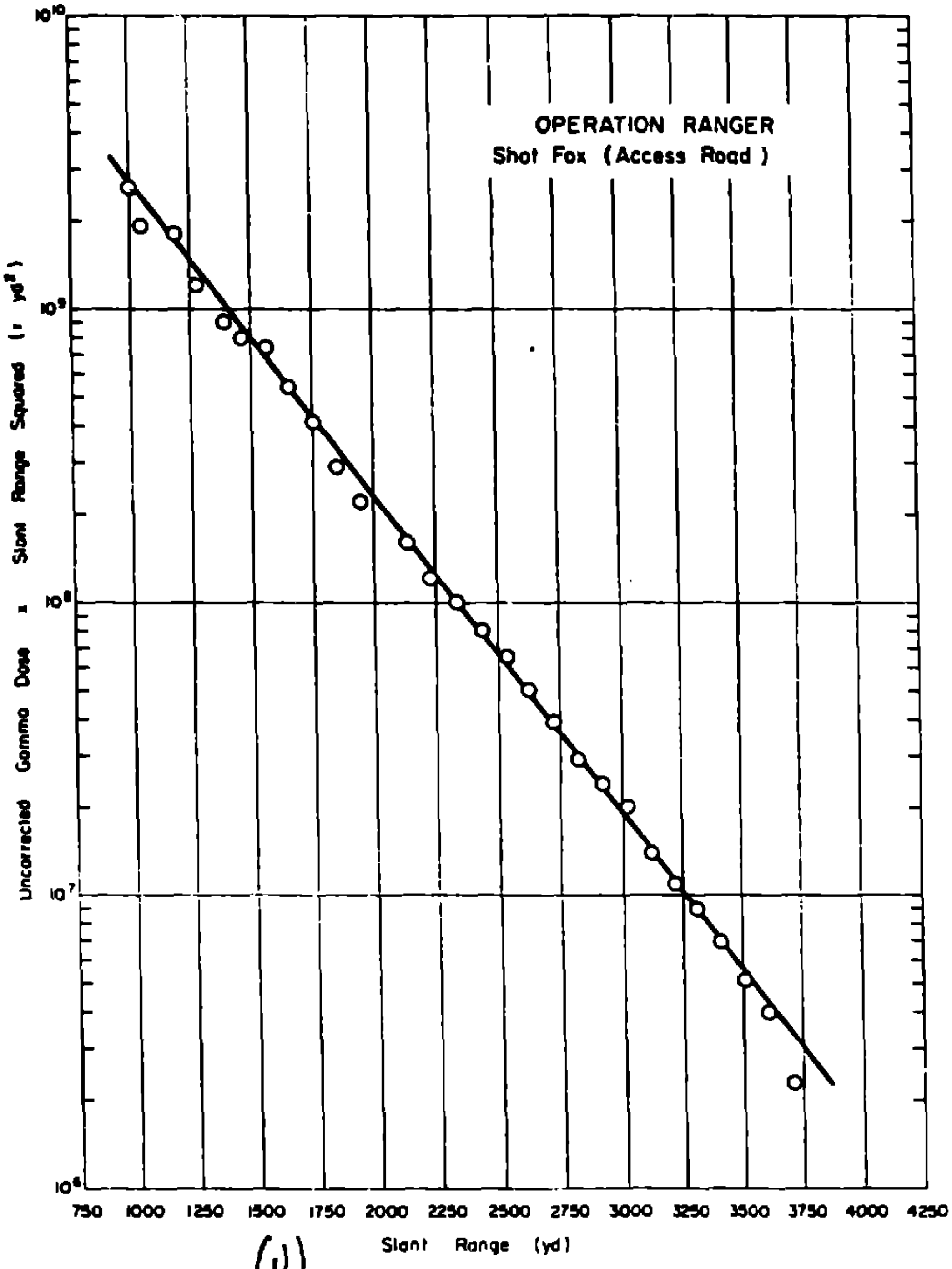


Figure 3.12 (~~S-RD~~) (U) Operation Ranger - Shot Fox (Access Road)-Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

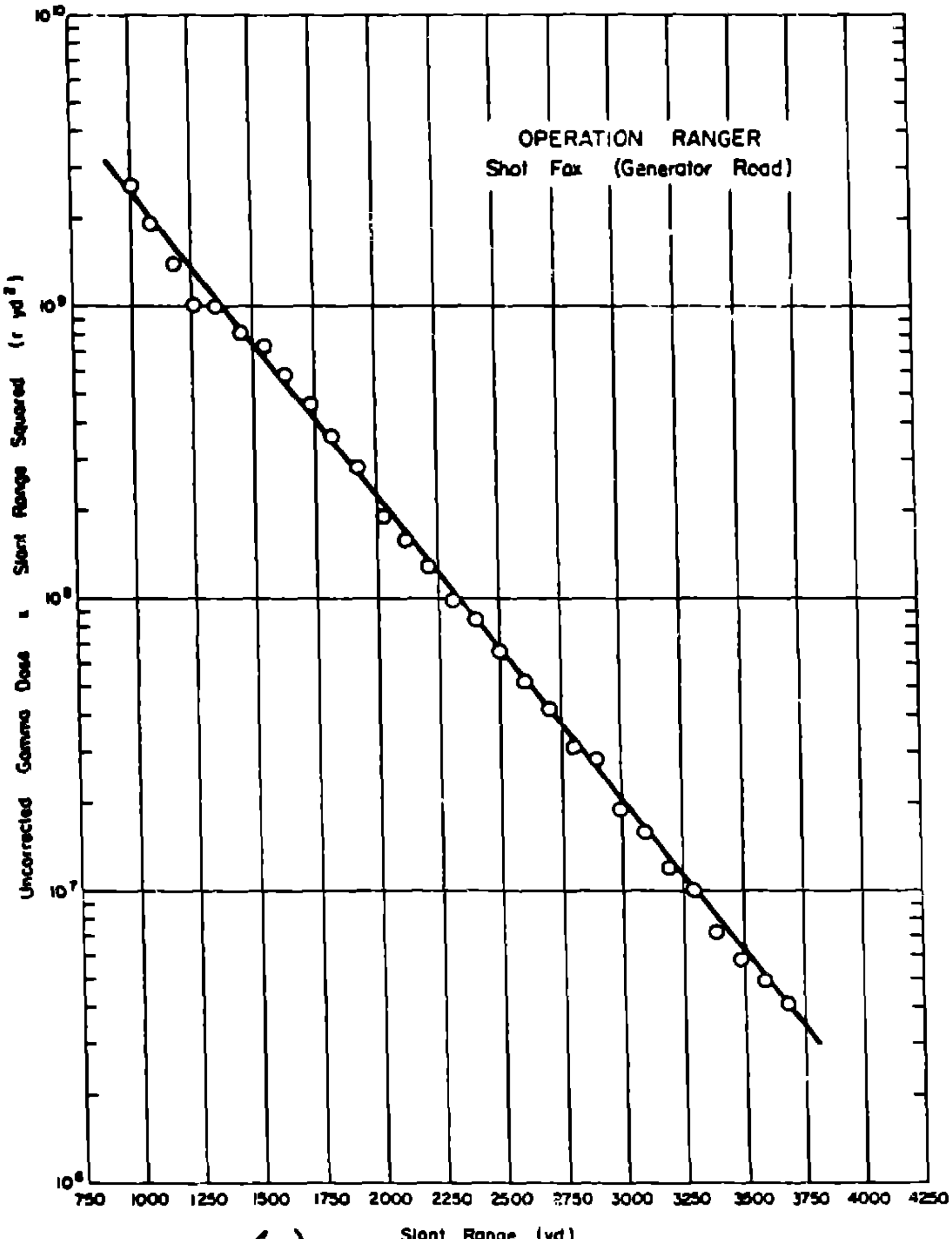


Figure 3.13 ~~(S-RD)~~ (U) Operation Ranger - Shot Fox (Generator Road) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(S-RD) TABLE 3.13 SHOT INFORMAIOTN - OPERATION GREENHOUSE

Shot Designation	Date and Time Fired	Name of Device	Location and Type	Height of Burst	Total	Fission
Dog	7 April 1951 1833:57 GMT		Yvonne-Tower	300		
Easy	20 April 1951 1827:00 GMT		Janet-Tower	300	46	
George	8 May 1951 2130:00 GMT		Ruth-Tower	200		
Item	24 May 1951 1816:59 GMT		Janet-Tower	200		

[a]Not reported.

(U) TABLE 3.14 METEOROLOGICAL DATA - OPERATION GREENHOUSE

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^a$
	mb	°K	$g/cm^3 \times 10^3$		
Dog	1000	298	1.17	0.90	1.23
Easy	1000	298	1.17	0.90	1.23
George	1000	300	1.17	0.90	1.23
Item	1000	304	1.15	0.89	1.26

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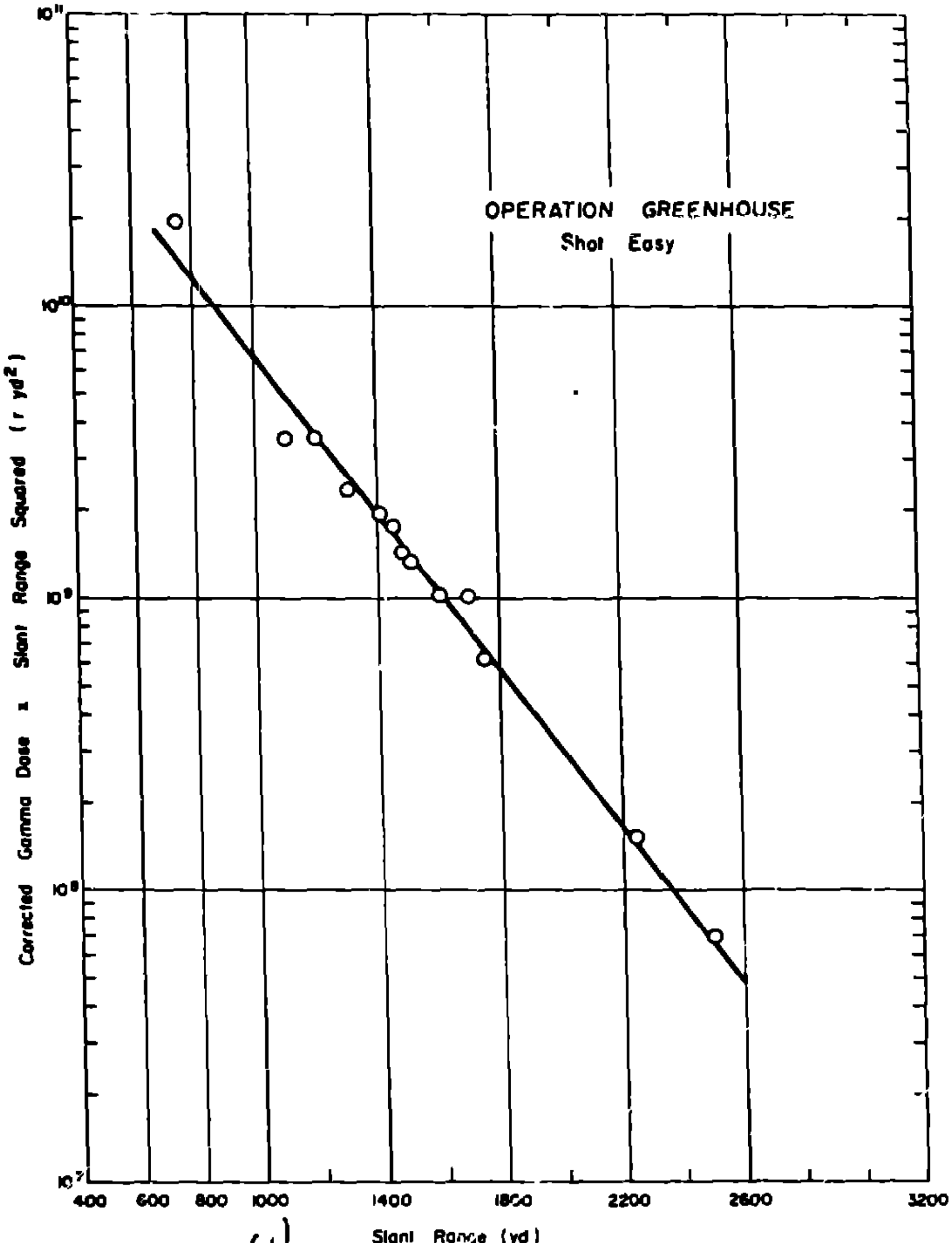

Figure 3.15 (~~S-RD~~) (U) Operation Greenhouse - Shot Easy - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

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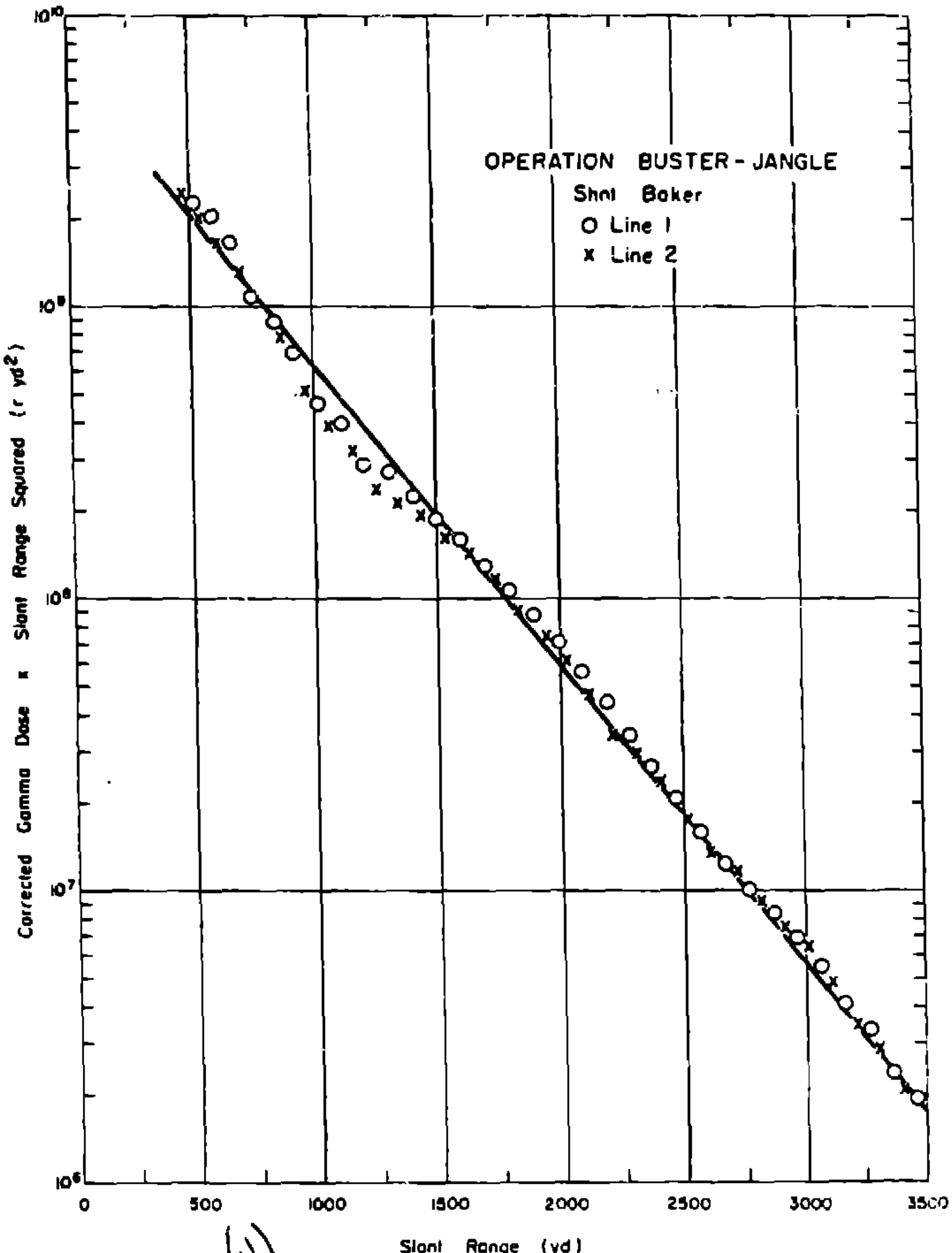
(S-RD) TABLE 3.19 SHOT INFORMATION - OPERATION BUSTER-JANGLE

Shot Designation	Date and Time Fired	Location and Type	Height of Burst (ft)	Total (kt)	Fission (kt)
Able	22 Oct 1951 1400 GMT	Area 7-Tower	100	1.8[a]	1.8[a]
Baker	28 Oct 1951 1520:09 GMT	Area 7-Air	1118	3.5	3.5
Charlie	30 Oct 1951 1500:29 GMT	Area 7-Air	1132	14.0	14.0
Dog	1 Nov 1951 1530:01 GMT	Area 7-Air	1417	21	21
Easy	5 Nov 1951 1629:58 GMT	Area 7-Air	1314	31	31
Surface	19 Nov 1951 1700 GMT	Area 9-Surface	3.5	1.2	1.2
Underground	29 Nov 1951 1959:59 GMT	Area 10-Underground	-17	1.2	1.2

[a]Grams

(U) TABLE 3.20 METEOROLOGICAL DATA - OPERATION BUSTER-JANGLE

Shot	Pressure	Temperature	Density $g/cm^3 x10^3$	ρ/ρ_s	$(\rho_s/\rho)^a$
Baker	877	284.4	1.05	0.81	1.53
Charlie	872	278.3	1.06	0.82	1.49
Dog	876	288.5	1.03	0.79	1.60
Easy	878	284.3	1.05	0.81	1.53
Surface	871.5	274	1.10	0.85	1.39



(U)

Figure 3.18 ~~(S-RD)~~ Operation Buster-Jangle - Shot Baker - Corrected gamma-dose-times-slant-range squared versus slant-range (U).

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(U)

(S-RD) TABLE 3.22 INITIAL GAMMA DOSE DATA - [illegible], SHOT CHARLIE

Line 1

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	[illegible]	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd				n/cm²	r	r		r	r	r		r	r
590	a	548-0	>30,000	1.82x10[illegible]	207	724	b	353	1284	<29,000	1.0	<29,000	503
670	a	548-0	15,200	5.53x10[illegible]	63	414	b	107	584	14,600	1.0	14,600	204
750	a	548-0	8,700	2.41x10[illegible]	27	241	b	47	315	8,386	1.0	8,380	103
840	a	548-0	5,480	1.12x10[illegible]	13	136	b	22	171	5,310	1.0	5,310	52
930	a	1290	2,610	5.81x10[illegible]	12	12	b	11	35	2,570	1.0	2,570	27
1,020	a	1290	1,910	3.36x10[illegible]	7.0	6.4	b	7.1	20.5	1,890	1.0	1,890	14
1,110	a	1290	1,300	1.94x10[illegible]	4.1	3.7	b	4.0	11.8	1,290	1.0	1,290	8.1
1,210	a	1290	870	1.12x10[illegible]	2.4	1.6	b	2.0	5.9	864	1.0	864	4.2
1,300	a	1290	590	6.56x10[illegible]	1.3	1.1	b	1.0	3.4	587	1.0	587	2.5
1,400	a	1290	380	3.67x10[illegible]	0.75	0.56	b	0.71	2.02	378	1.0	378	1.3
1,510	a	1290	[illegible]	2.24x10[illegible]	0.42	0.32	b	0.41	1.15	[illegible]	1.0	[illegible]	<1.3
1,590	a	606	180	1.20x10[illegible]	0.27	0.08	b	0.21	0.56	[illegible]	1.0	[illegible]	<1.3
1,690	a	606	[illegible]	6.72x10[illegible]	0.15	0.04	b	0.13	0.32	140	1.0	140	<1.3
1,790	a	606	[illegible]	5.04x10[illegible]	0.12	0.02	b	0.10	0.24	[illegible]	1.0	[illegible]	<1.3
1,890	a	606	70	2.10x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	70	1.0	70	<1.3
1,980	a	606	46	1.15x10[illegible]	<0.12	0.02	b	<0.10	<0.24	44	1.0	[illegible]	<1.3
2,080	a	606	[illegible]	[illegible]	<0.12	<0.02	b	<0.10	<0.24	35	1.0	[illegible]	<1.3
2,180	a	510	25	3.74x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	25	1.0	[illegible]	<1.3
2,280	a	510	19	2.09x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	19	1.0	19	<1.3
2,380	a	510	14	1.15x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	14	1.0	14	<1.3
2,480	a	510	10.0	6.47x10[illegible]	<0.12	<0.02	b	[illegible]	<0.24	10.0	1.0	10.0	<1.3
2,580	a	502	6.8	3.54x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	6.8	1.0	[illegible]	<1.3
2,680	a	502	5.9	1.97x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	5.9	1.0	5.9	<1.3
2,770	a	502	4.3	3.16x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	4.3	1.0	4.3	<1.3
2,870	a	502	3.1	6.56x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	3.1	1.0	3.1	<1.3
2,970	a	502	[illegible]	[illegible]	<0.12	<0.02	b	[illegible]	<0.24	2.3	1.0	[illegible]	<1.3
3,070	a	502	1.7	1.94x10[illegible]	<0.12	<0.02	b	[illegible]	<0.24	1.7	1.0	1.7	<1.3
3,170	a	502	1.3	[illegible]	<0.12	<0.02	b	<0.10	<0.24	1.3	1.0	[illegible]	<1.3
3,270	a	502	[illegible]	6.30x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	[illegible]	1.0	[illegible]	<1.3
3,370	a	502	[illegible]	3.50x10[illegible]	<0.12	<0.02	b	<0.10	<0.24	[illegible]	1.0	[illegible]	<1.3
3,470	a	502	[illegible]	1.90x10[illegible]	<0.12	<0.02	b	[illegible]	<0.24	[illegible]	1.0	[illegible]	<1.3
3,570	a	[illegible]	[illegible]	<1x10[illegible]	[illegible]	[illegible]	b	[illegible]	<0.24	[illegible]	1.0	[illegible]	<1.3
3,670	a	[illegible]	[illegible]	<1x10[illegible]	[illegible]	[illegible]	b	[illegible]	<0.24	[illegible]	1.0	[illegible]	<1.3
3,770	a	[illegible]	[illegible]	<1x10[illegible]	[illegible]	[illegible]	b	<0.10	<0.24	[illegible]	1.0	[illegible]	<1.3
3,870	a	[illegible]	[illegible]	<1x10[illegible]	[illegible]	<0.02	b	<0.10	<0.24	[illegible]	1.0	[illegible]	<1.3
3,970	a	[illegible]	[illegible]	[illegible]	<0.1	<0.02	b	<0.10	<0.24	[illegible]	1.0	[illegible]	<1.3

[a] [illegible]

[b] [illegible] film holders attached to [illegible] stake.

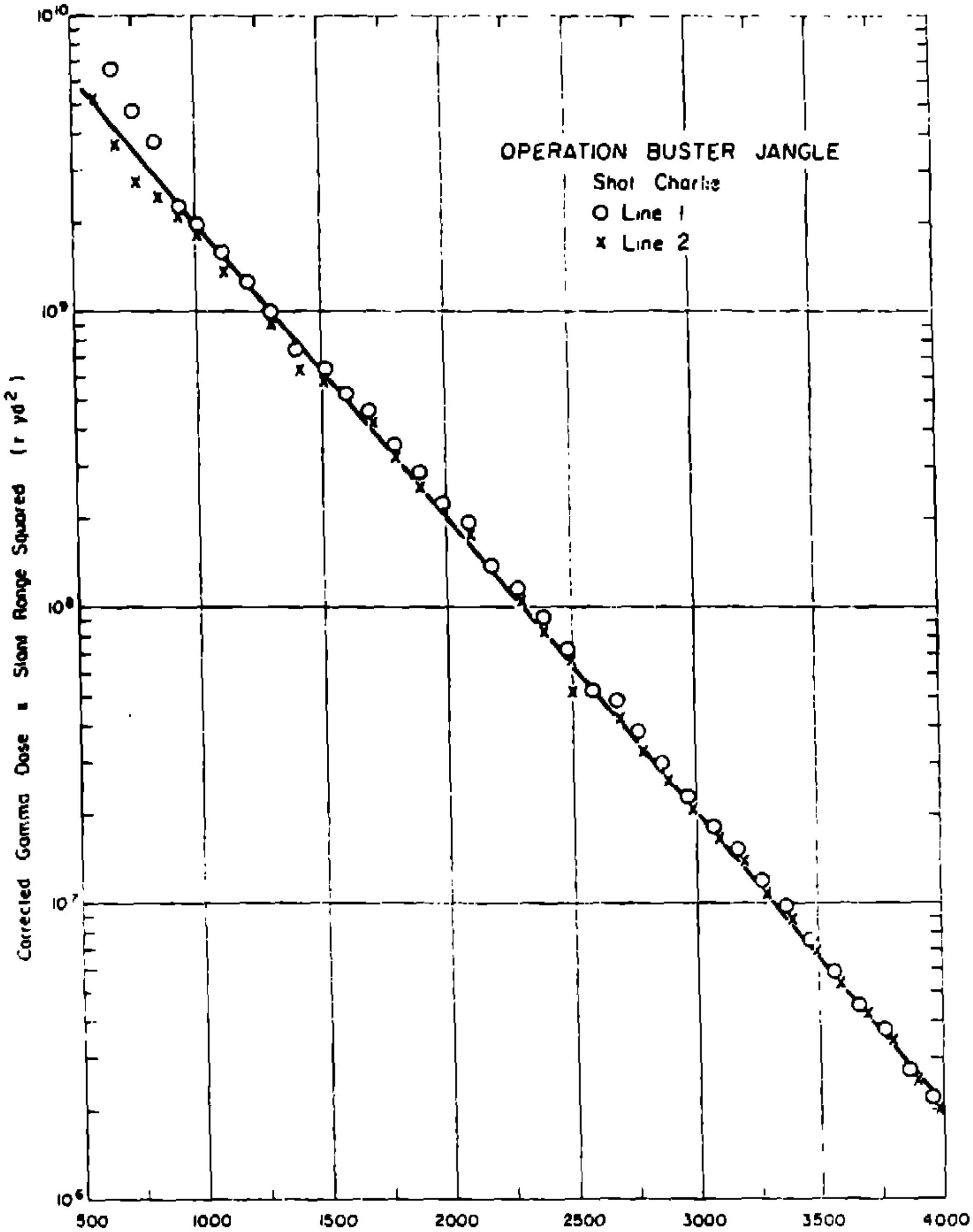
(U) Table [illegible] (continued)

Line 2

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	nv	Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
520	a	548-D	>30,000	5.10x10[illegible]	587	1140	b	1000	2729	>27,000	1.0	>27,000	1210
600	a	548-D	15,660	1.57x10[illegible]	178	655	b	304	1337	14,520	1.0	14,520	445
680	a	548-D	8,440	4.90x10[illegible]	56	375	b	99	530	7,910	1.0	7,910	165
760	a	548-D	5,050	2.21x10[illegible]	25	232	b	43	300	4,750	1.0	4,750	154
850	a	548-D	3,480	1.01x10[illegible]	11	146	b	20	155	3,330	1.0	3,330	48
940	a	1290	2,440	5.53x10[illegible]	11	11	b	11	33	2,410	1.0	2,410	25
1,030	a	1290	1,740	3.32x10[illegible]	6.8	6.1	b	6.0	18.9	1,720	1.0	1,720	14
1,120	a	1290	1,090	1.93x10[illegible]	4.0	3.4	b	4.0	11.4	1,050	1.0	1,050	7.5
1,220	a	1290	635	1.08x10[illegible]	2.2	1.8	b	2.0	6.0	829	1.0	[illegible]	4.2
1,310	a	1290	540	6.16x10[illegible]	1.3	0.94	b	1.0	3.24	537	1.0	537	2.1
1,410	a	1290	320	3.47x10[illegible]	0.71	0.48	b	0.70	1.89	318	1.0	318	1.0
1,510	a	1290	[illegible]	[illegible]	0.40	0.24	b	[illegible]	1.04	[illegible]	1.0	[illegible]	<1.0
1,600	a	[illegible]	[illegible]	[illegible]	0.26	0.09	b	[illegible]	0.55	[illegible]	1.0	[illegible]	<1.0
1,700	a	[illegible]	[illegible]	[illegible]	0.14	0.04	b	0.10	0.28	[illegible]	1.0	[illegible]	<1.0
1,800	a	[illegible]	[illegible]	3.57x10[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
1,900	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,000	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,090	a	510	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,1[illegible]	a	510	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,250	a	510	17	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	17	1.0	[illegible]	<1.0
2,350	a	510	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,450	a	502	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,5[illegible]	a	502	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,6[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,7[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,8[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
2,9[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
3,000	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
3,1[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
3,200	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
3,3[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	<0.28	[illegible]	1.0	[illegible]	<1.0
3,4[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	<0.10	[illegible]	[illegible]	1.0	[illegible]	<1.0
3,5[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	<0.10	[illegible]	[illegible]	1.0	[illegible]	<1.0
3,6[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	[illegible]	<0.28	[illegible]	1.0	[illegible]	<1.0
3,7[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0
3,8[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0
3,9[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0

a [illegible]

b [illegible]



(U)
Figure 3.19 (S-RD) Operation Buster-Jangle - Shot Charlie - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) [illegible] TAB[illegible] INITIAL GAMMA [illegible] OPERATION [illegible] TEA-JANGLE, SHOT BUG

Line 1

Slant Range	[illegible]	Film [illegible]	Uncorrected Gamma Dose	Au (Neutron Flux)	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
700	a	540-0	>30,000	6.93x10^11	79	552	b	194	765	>29,000	1.0	>29,000	289
700	a	545-0	15,660	3.05x10^11	39	398	b	59	[illegible]	15,210	1.0	[illegible]	150
[illegible]	a	540-0	11,300	1.51x10^11	17	197	b	29	[illegible]	11,100	1.0	11,100	79
950	a	540-0	6,700	7.77x10^10	8.8	110	b	15	133.8	[illegible]	1.0	[illegible]	43
1,030	a	540-0	3,830	[illegible]	5.3	66	b	9.0	80.3	3,750	1.0	[illegible]	[illegible]
1,120	a	[illegible]	2,440	[illegible]	5.6	5.6	b	5.2	16.4	[illegible]	1.0	[illegible]	11
1,220	a	1290	1,570	[illegible]	3.1	3.2	b	2.9	[illegible]	[illegible]	1.0	[illegible]	6.9
1,310	a	[illegible]	1,090	9.0[illegible]x10^9	1.8	1.6	b	1.7	5.1	[illegible]	1.0	[illegible]	3.6
1,400	a	[illegible]	[illegible]	[illegible]	1.1	0.88	b	1.0	[illegible]	712	1.0	[illegible]	1.2
1,500	a	[illegible]	[illegible]	[illegible]	0.59	0.48	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.2
1,590	a	[illegible]	[illegible]	1.70x10^9	0.35	[illegible]	b	[illegible]	0.91	[illegible]	1.0	[illegible]	<1.2
1,680	a	[illegible]	[illegible]	[illegible]	0.19	0.16	b	0.19	[illegible]	[illegible]	1.0	[illegible]	<1.2
1,750	a	[illegible]	[illegible]	[illegible]	0.13	0.08	b	0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
1,850	a	[illegible]	[illegible]	[illegible]	<0.13	<0.08	b	<0.11	<0.32	[illegible]	1.0	[illegible]	<1.2
1,950	a	[illegible]	84	[illegible]	<0.13	<0.08	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
2,000	a	[illegible]	[illegible]	[illegible]	<0.13	[illegible]	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
2,170	a	[illegible]	[illegible]	[illegible]	<0.13	[illegible]	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
2,270	a	[illegible]	[illegible]	[illegible]	<0.13	[illegible]	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
2,370	a	510	[illegible]	[illegible]	[illegible]	<0.08	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
2,470	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.08	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	<1.2
2,5[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.08	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	<0.11	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
3,0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
3,1[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]									

[illegible]

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(S-~~RD~~) (U) TABLE 3.23 (Continued)

Line 2

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	[illegible]	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
620	a	548-0	>30,000	1.91x10^12	<17	965	b	370	1552	>28,000	1.0	>28,000	642
690	a	548-0	22,600	7.67x10^11	87	620	b	149	856	21,700	1.0	21,700	316
770	a	548-0	15,660	3.26x10^11	37	379	b	63	479	15,180	1.0	15,180	[illegible]
850	a	548-0	9,570	1.6[illegible]x10^11	19	210	b	32	261	9,310	1.0	9,310	[illegible]
940	a	548-0	5,740	8.30x10^10	9.4	117	b	16	142.4	5,600	1.0	5,600	[illegible]
1,020	a	548-0	3,830	4.94x10^10	5.6	69	b	10	[illegible]	3,790	1.0	3,790	[illegible]
1,110	a	1290	2,610	2.9[illegible]x10^10	6.0	6.1	b	5.6	17.7	2,590	1.0	2,590	[illegible]
1,210	a	1290	1,650	1.6[illegible]x10^10	3.3	3.2	b	3.1	9.6	1,640	1.0	1,640	7.2
1,300	a	1290	1,000	9.45x10^9	1.9	1.6	b	1.8	5.3	995	1.0	995	3.6
1,[illegible]	a	1290	650	[illegible].57x10^9	1.1	1.0	b	1.1	3.2	647	1.0	647	1.2
1,[illegible]	a	1290	470	2.9[illegible]x10^9	0.60	0.50	b	0.56	1.66	[illegible]	1.0	[illegible]	<1.2
1,5[illegible]	a	1290	[illegible]	1.61x10^9	0.37	0.28	b	0.34	0.99	[illegible]	1.0	[illegible]	<1.2
1,[illegible]	a	[illegible]	[illegible]	9.[illegible]x10^8	0.20	0.14	b	0.19	0.53	[illegible]	1.0	[illegible]	<1.2
1,7[illegible]	a	606	165	5.88x10^8	0.11	0.06	b	0.11	0.28	[illegible]	1.0	[illegible]	<1.2
1,8[illegible]	a	606	110	3.26x10^8	0.07	0.02	b	0.06	0.15	[illegible]	1.0	[illegible]	<1.2
1,97[illegible]	a	606	83	1.81x10^8	<0.07	<0.02	b	<0.06	<0.15	[illegible]	1.0	[illegible]	<1.2
2,0[illegible]	a	606	62	1.07x10^8	<0.07	<0.02	b	<0.06	<0.15	[illegible]	1.0	[illegible]	<1.2
2,160	a	606	47	5.92x10^7	<0.07	<0.02	b	<0.06	<0.15	47	1.0	[illegible]	<1.2
2,260	a	510	32	3.30x10^7	<0.07	<0.02	b	<0.06	<0.15	[illegible]	1.0	[illegible]	<1.2
2,360	a	510	23	1.82x10^7	<0.07	<0.02	b	<0.06	<0.15	23	1.0	[illegible]	<1.2
2,460	a	510	17	9.38x10^6	<0.07	<0.02	b	<0.06	<0.15	17	1.0	17	<1.2
2,550	a	510	13	5.0[illegible]x10^6	<0.07	<0.02	b	<0.06	<0.15	13	1.0	[illegible]	<1.2
2,650	a	502	9.6	3.26x10^6	<0.07	<0.02	b	<0.06	<0.15	9.6	1.0	9.6	<1.2
2,750	a	502	6.6	1.51x10^6	<0.07	<0.02	b	<0.06	<0.15	6.6	1.0	6.6	<1.2
2,850	a	502	4.8	1.01x10^6	<0.07	<0.02	b	<0.06	<0.15	4.8	1.0	[illegible]	<1.2
2,950	a	502	3.5	5.57x10^5	<0.07	<0.02	b	<0.06	<0.15	3.5	1.0	3.5	<1.2
3,050	a	502	2.6	3.15x10^5	<0.07	<0.02	b	<0.06	<0.15	[illegible]	1.0	[illegible]	<1.2
3,150	a	502	1.8	1.72x10^5	<0.07	<0.02	b	<0.06	<0.15	1.8	1.0	1.8	<1.2
3,240	a	502	1.5	1.03x10^5	<0.07	<0.02	b	<0.06	<0.15	1.5	1.0	1.5	<1.2
3,340	a	502	1.1	5.71x10^4	<0.07	<0.02	b	<0.06	<0.15	1.1	1.0	1.1	<1.2
3,440	a	502	0.79	3.39x10^4	<0.07	<0.02	b	<0.06	<0.15	0.79	1.0	0.79	<1.2
3,540	a	502	0.59	1.84x10^4	<0.07	<0.02	b	<0.06	<0.15	0.59	1.0	0.59	<1.2
3,640	a	502	0.44	1.[illegible]x10^4	<0.07	<0.02	b	<0.06	<0.15	0.44	1.0	0.44	<1.2
3,740	a	[illegible]	[illegible]	<1x10^4	<0.07	<0.02	b	<0.06	<0.15	0.31	1.0	[illegible]	<1.2
3,840	a	[illegible]	[illegible]	<1x10^4	<0.07	<0.02	b	<0.06	<0.15	[illegible]	1.0	[illegible]	<1.2
3,940	a	502	[illegible]	<1x10^4	<0.07	<0.02	b	<0.06	<0.15	0.1[illegible]	1.0	[illegible]	<1.2
4,040	a	502	0.1	[illegible]	<0.07	<0.02	b	<0.06	<0.15	0.1[illegible]	1.0	0.1	<1.2

[a] 280°.

[b] [illegible]

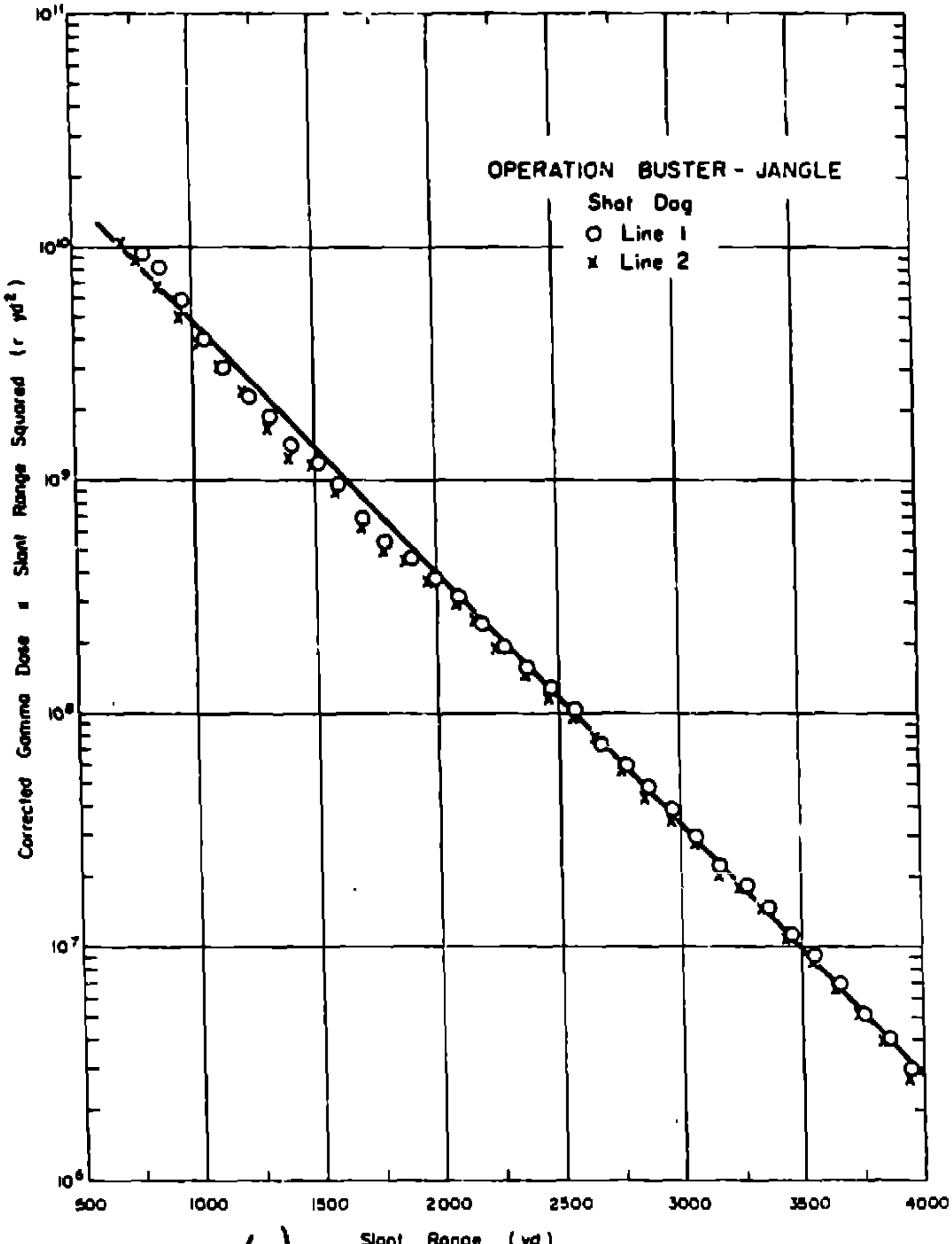


Figure 3.20 (~~S-RD~~) (U) Operation Buster-Jangle - Shot Dog - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) (S-RD) TABLE 3.24 INITIAL GAMMA DOSE - OPERATION BUSTER-JANGLE, SHOT EASY

Line 1

Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	nvt	Thermal Correc-tion	Fast Correc-tion	Shield Type	Shield Correc-tion	Total Correc-tion	Cor-rected Gamma Dose	Atten-uation Factor	Final Corrected Gamma Dose	Soil Contri-bution
yd			r	n/cm²	r	r		r	r	r		r	r
780	a	548-0	>30,000	[illegible]	320	2380	b	548	3248	>27,000	1.0	>27,000	1120
860	a	548-0	20,000	[illegible]	175	1310	b	298	1783	18,200	1.0	18,200	586
950	a	548-0	12,180	[illegible]	95	900	b	161	1156	11,020	1.0	11,020	317
1,040	a	548-0	7,310	[illegible]	55	552	b	94	701	6,610	1.0	6,610	[illegible]
1,130	a	548-0	4,780	[illegible]	33	[illegible]	b	55	412	4,370	1.0	4,370	[illegible]
1,220	a	548-0	2,700	[illegible]	19	196	b	33	246	2,450	1.0	[illegible]	72
1,320	a	[illegible]	1,740	[illegible]	20	18	b	19	57	1,680	1.0	[illegible]	[illegible]
1,410	a	1290	[illegible]	[illegible]	12	11	b	11	34	1,100	1.0	[illegible]	[illegible]
1,510	a	1290	750	[illegible]	6.4	6.0	b	6.0	18.4	732	1.0	[illegible]	[illegible]
1,600	a	1290	[illegible]	[illegible]	3.9	3.6	b	3.7	11.2	479	1.0	[illegible]	[illegible]
1,700	a	1290	[illegible]	[illegible]	2.2	2.0	b	2.1	6.3	[illegible]	1.0	[illegible]	[illegible]
1,800	a	1290	[illegible]	[illegible]	1.2	1.2	b	1.2	3.6	[illegible]	1.0	[illegible]	[illegible]
1,890	a	[illegible]	165	[illegible]	0.82	0.40	b	0.69	1.91	[illegible]	1.0	[illegible]	1.0
1,990	a	606	[illegible]	[illegible]	0.46	0.24	b	0.39	1.09	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	606	[illegible]	[illegible]	0.26	0.16	b	0.22	0.64	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	606	[illegible]	[illegible]	0.15	0.08	b	0.12	0.35	[illegible]	1.0	[illegible]	<1.0
2,340	a	606	[illegible]	3.01x10[illegible]	0.08	0.04	b	0.07	0.19	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	606	[illegible]	2.17x10[illegible]	0.05	0.03	b	0.04	0.12	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	510	[illegible]	1.21x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
2,500	a	510	[illegible]	[illegible]	<0.05	<0.03	b	<0.04	<0.12	20	1.0	[illegible]	<1.0
[illegible]	a	510	14	3.77x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	14	1.0	14	<1.0
2,750	a	510	[illegible]	2.14x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	502	[illegible]	1.19x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	6.9	1.0	6.9	<1.0
2,970	a	502	[illegible]	7.07x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
3,070	a	502	[illegible]	4.02x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
3,170	a	502	[illegible]	[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	502	[illegible]	1.29x10[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	502	[illegible]	[illegible]	<0.05	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	502	[illegible]	[illegible]	[illegible]	<0.03	b	<0.04	<0.12	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	502	[illegible]	[illegible]	<0.05	<0.03	b	<0.04	[illegible]	[illegible]	1.0	[illegible]	<1.0
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.03	b	<0.04	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	<0.12	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.03	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	<0.04	[illegible]	[illegible]	1.0	[illegible]	[illegible]

[illegible]

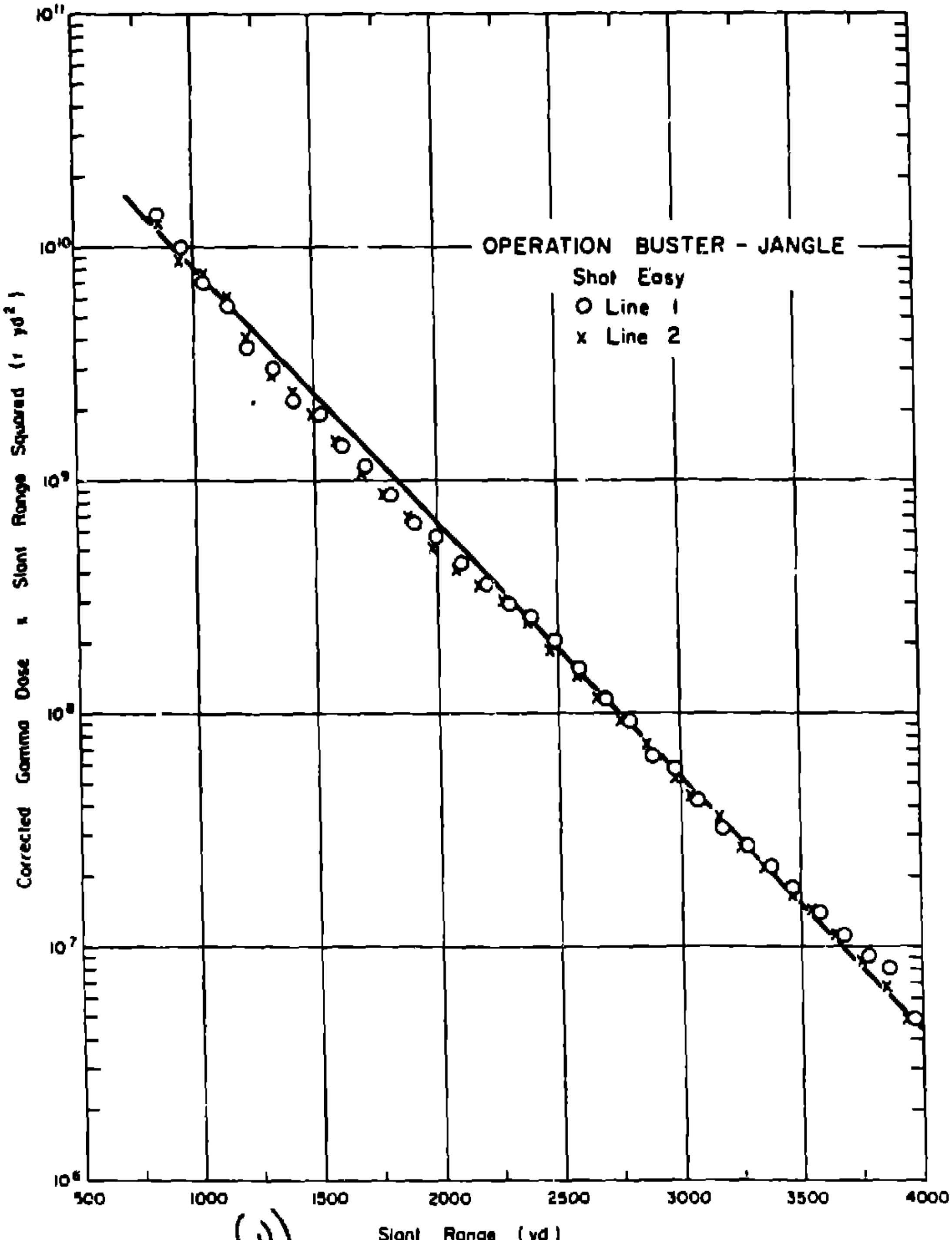
(U) TABLE [illegible] (Continued)

Line 2

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	[illegible]	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
720	a	548-0	>30,000	5.0[illegible]	270	3350	b	975	4693	>[illegible]	1.0	[illegible],000	1770
863	a	548-0	20,000	1.55x10[illegible]	176	1480	b	300	1956	[illegible]	1.0	[illegible]	645
940	a	548-0	11,300	8.9[illegible]	102	960	b	175	[illegible]	10,100	1.0	10,100	389
1,030	a	[illegible]	7,600	5.0[illegible]	58	584	b	91	740	7,000	1.0	7,000	224
1,120	a	[illegible]	5,310	[illegible]	[illegible]	344	b	59	430	4,870	1.0	4,970	127
1,220	a	[illegible]	3,065	1.70x10[illegible]	19	190	b	[illegible]	242	2,803	1.0	[illegible]	69
1,310	a	1290	1,655	9.[illegible]	20	18	b	19	57	[illegible]	1.0	1,598	40
1,400	a	[illegible]	1,220	[illegible]	13	11	b	12	36	1,184	1.0	1,184	25
1,500	a	1290	760	[illegible]	6.9	6.1	b	6.5	19.5	[illegible]	1.0	[illegible]	13
1,600	a	1290	510	[illegible]	3.9	3.6	b	3.7	11.2	[illegible]	1.0	[illegible]	7.3
1,690	a	1290	340	[illegible]	2.3	2.1	b	2.2	6.6	[illegible]	1.0	[illegible]	4.4
1,790	a	[illegible]	240	[illegible]	1.5	0.75	b	1.2	3.35	[illegible]	1.0	[illegible]	2.3
1,850	a	[illegible]	170	3.55x10[illegible]	0.81	0.43	b	0.70	1.94	[illegible]	1.0	[illegible]	1.3
1,960	a	[illegible]	110	2.17x10[illegible]	0.50	0.28	b	0.41	1.19	[illegible]	1.0	[illegible]	<1.3
2,050	a	[illegible]	87	1.2[illegible]x10[illegible]	0.28	0.15	b	0.23	0.67	[illegible]	1.0	[illegible]	<1.3
2,150	a	[illegible]	64	[illegible].81x10[illegible]	0.16	0.08	b	0.13	0.37	[illegible]	1.0	[illegible]	<1.3
2,250	a	[illegible]	51	[illegible].50x10[illegible]	0.09	0.04	b	0.07	0.20	[illegible]	1.0	[illegible]	<1.3
2,370	a	[illegible]	37	2.2[illegible]	0.05	[illegible]	b	0.04	0.10	[illegible]	1.0	[illegible]	<1.3
2,470	a	510	27	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
2,570	a	[illegible]	19	7.2[illegible]	<0.05	<0.007	b	<0.04	<0.10	19	1.0	19	<1.3
2,670	a	510	[illegible]	4.0[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
2,770	a	510	10.9	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
2,870	a	[illegible]	7.7	1.26x10[illegible]	<0.05	<0.007	b	<0.04	<0.10	7.7	1.0	[illegible]	<1.3
2,970	a	[illegible]	[illegible]	7.[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,070	a	[illegible]	[illegible]	4.0[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,160	a	[illegible]	[illegible]	2.39x10[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,240	a	[illegible]	[illegible]	1.[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,340	a	[illegible]	[illegible]	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,440	a	[illegible]	[illegible]	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,540	a	[illegible]	[illegible]	2.4[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,640	a	[illegible]	[illegible]	1.3[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,700	a	[illegible]	[illegible]	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,800	a	[illegible]	[illegible]	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
3,900	a	[illegible]	[illegible]	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3
4,000	a	[illegible]	[illegible]	[illegible]	<0.05	<0.007	b	<0.04	<0.10	[illegible]	1.0	[illegible]	<1.3

[illegible]

[illegible]



(U)

Figure 3.21 (S-RD) Operation Buster-Jangle - Shot Easy - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE [illegible] INITIAL GAMMA D[illegible] [illegible] BUSTER-JANGLE, SURFACE SHOT

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Fallout Contribution	Shield Type
yd			r	r	
667	15°	E-548-0	775	500	b
1,000	15°	D-605	10[illegible]	50	b
1,333	15°	D-510	25	25	b
2,000	15°	D-510, D-502	5.0	12	b
2,667	15°	D-502	2.5	0.2	b
3,667	15°	D-510	11	25	b
4,667	15°	D-510	12.0	22	b
667	50°	E-548-0	715	50	b
1,000	50°	D-605	95	5	b
1,333	50°	D-510	18	8	b
2,000	50°	D-502	1	0.5	b
2,667	50°	a	Below Range	a	b
667	90°	E-548-0	715	50	b
1,000	90°	D-605	90	5	b
1,333	90°	D-510	10.8	2	b
667	165°	E-548-0	656	50	b
1,333	165°	D-510	15	0	b
2,000	165°	D-502	0.8	0	b
667	[illegible]	E-548-0	[illegible]	0	b
1,333	[illegible]	D-510	[illegible]	0	b
2,000	[illegible]	D-502	0.9	0	b
667	355°	E-548-0	2,730	1,[illegible]	b
1,000	355°	E-548-0	[illegible]	600	b
1,333	355°	D-605	[illegible]	[illegible]	b
2,000	355°	D-502	[illegible]	18	b
3,000	[illegible]	a	Below Range	a	b

[a]Not reported.
[b]NBS film badge.

(U) TABLE [illegible] INITIAL GAMMA DOSE DATA - OPERATION BUSTER-JANGLE, UNDERGROUND SHOT

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Fallout Contribution	Shield Type
yd			r	r	
667	35°	E-548-0	2,700	800	b
1,000	35°	D-605	160	300	b
1,333	35°	D-605, D-510	50	65	b
2,000	35°	D-605	220	250	b
2,667	35°	D-605	65	90	b
3,667	35°	D-605	70	90	b
667	75°	E-548-0	1,650	1,000	b
1,000	75°	D-605	100	50	b
1,333	75°	D-510	18	15	b
2,000	75°	a	Below Range	a	b
3,000	75	a	Below Range	a	b
667	240°	E-548-0	1,150	150	b
1,333	240°	a	Below Range	a	b
2,000	240°	a	Below Range	a	b
667	315°	E-548-0	2,000	1,200	b
1,000	315°	D-605	165	100	b
1,333	315°	D-510, D-605	50	60	b
2,000	315°	a	Below Range	a	b
3,000	315°	a	Below Range	a	b
667	355°	E-548-0	4,000	2,700	b
1,000	355°	E-548-0	2,800	2,080	b
1,333	355°	E-548-0	2,060	1,950	b
2,000	355°	E-548-0	630	1,000	b
2,667	355°	D-605	520	400	b
3,667	355°	D-605	75	90	b
4,667	355°	D-605, D-510	40	40	b

[a]Not reported.
[b]NBS film badge.

(U) TABLE 3.27 SHOT INFORMATION OPERATION TUMBLER-SNAPPER

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total	Yield Fission	Thickness
			ft	kt	kt	cm
1 (Tumbler I)	1 April 1952 1700:07 GMT	F.F.-Air	793	1.05	1.05	43.97
2 (Tumbler II)	15 April 1952 1729:57 GMT	Area 7-Air	1109	1.17	1.17	43.97
3 (Tumbler III)	22 April 1952 1730:10 GMT	Area 7-Air	3447	30	30	43.97
4 (Tumbler IV or Snapper I)	1 May 1952 1629:59 GMT	Area 7-Air	1040	18.5	18.3	13.49
5 (Snapper II)	7 May 1952 1214:59 GMT	Area T-1-Tower	300	12.5	12.5	13.17
6 (Snapper III)	25 May 1952 1159:59 GMT	Area 4-Tower	300	11.5	11.5	26.03
7 (Snapper IV)	1 June 1952 1154:59 GMT	Area 3-Tower	300	15.8	15.8	26.03
8 (Snapper V)[a]	5 June 1952 1155:00 GMT	Area 2-Tower	300	13.9	13.9	13.17

[a] Light Tamper Weapons.

(U) TABLE 3.29 METEOROLOGICAL DATA - OPERATION TUMBLER-SNAPPER

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^2$
	mb	°K	$g/cm^3 \times 10^3$		
2	878	284.6	1.05	0.81	1.53
3	873	291.9	0.99	0.76	1.73
4	877	290.1	1.03	0.79	1.60
5	868	288.8	1.04	0.80	1.56
6	868	286.9	1.05	0.81	1.53
7	872	285.0	1.06	0.82	1.49
8	863	290.8	1.03	0.79	[illegible]

(U) TABLE 3.[illegible] SCEL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT [illegible] (TUMBLER II)

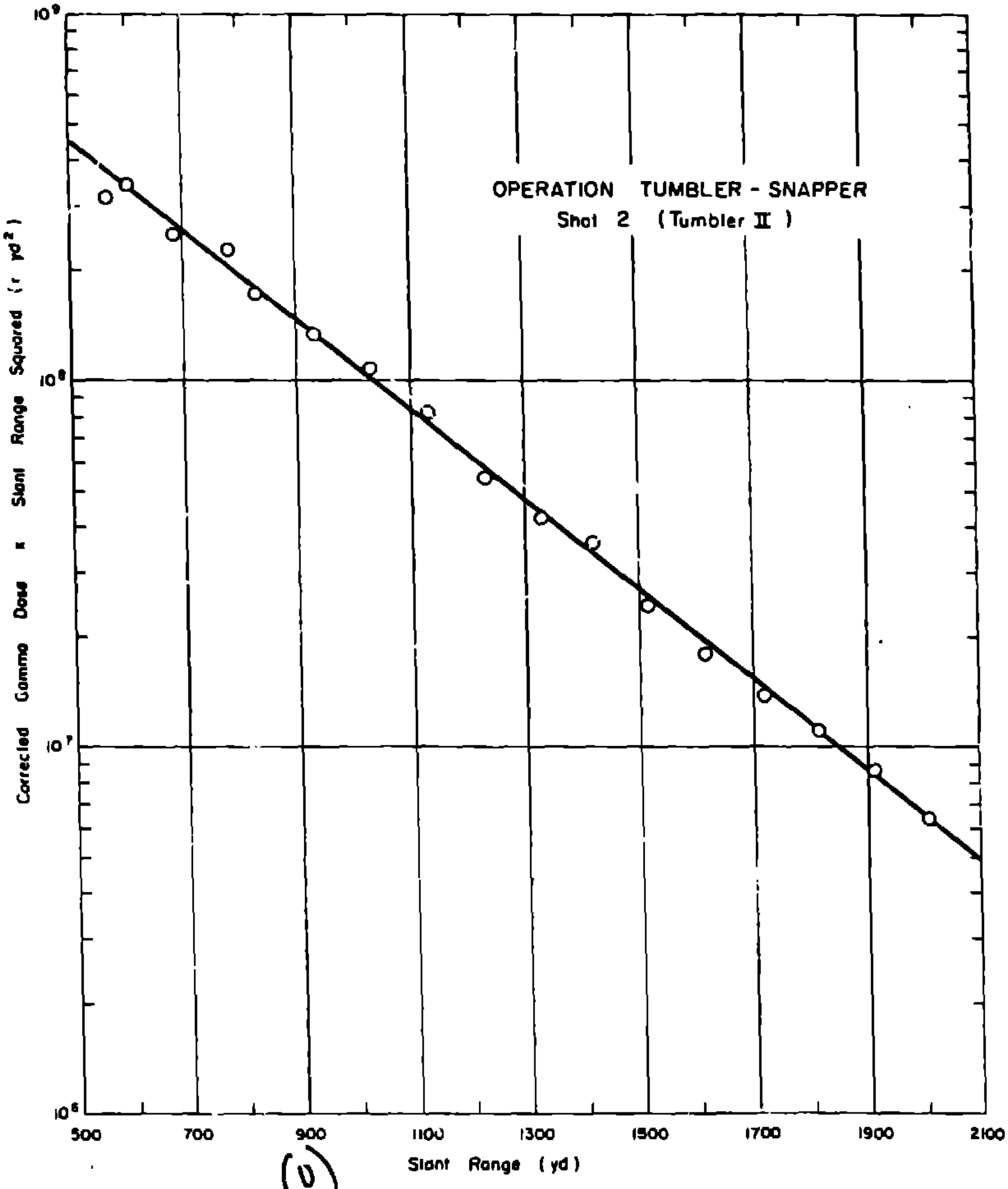
Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Au Flux	Au Thermal Correc-tion	Fast Correc-tion	Shield Type	Shield Correc-tion	Total Correc-tion	Cor-rected Gamma Dose	Atten-uation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
503	a	548-0	1,035	4.5[illegible]x10⁸ c	5.2	41	b	c	46.2	989	1.0	989	14
602	a	1290	950	3.[illegible]x10⁸ c	7.0	5.1	b	c	12.1	939	1.0	938	11
653	a	1290	544	1.[illegible]x10⁸ c	4.1	2.8	b	c	6.9	537	1.0	537	5.3
742	a	1290	378	9.5 x 10⁷	2.0	1.4	b	c	3.4	375	1.0	375	3.2
830	a	1290	253	7.1[illegible]x10⁷	1.5	0.94	b	c	2.44	251	1.0	251	1.6
[illegible]	a	1290	156	3.57x10⁷	0.73	0.24	b	c	0.97	155	1.0	155	1.0
1,030	a	[illegible]	103	1.7[illegible]x10⁷	0.40	0.14	b	c	0.54	102	1.0	102	<1.0
1,136	a	[illegible]	64	8.8[illegible]x10⁶	0.20	0.09	b	c	0.29	64	1.0	64	<1.0
1,230	a	606	36	4.45x10⁶	0.10	0.03	b	c	0.13	36	1.0	36	<1.0
1,330	a	606	24	2.20x10⁶	<0.10	<0.03	b	c	<0.13	24	1.0	24	<1.0
1,423	a	606	18	1.21x10⁶	<0.10	<0.03	b	c	<0.13	18	1.0	18	<1.0
1,517	a	510	10.5	6.20x10⁵	<0.10	<0.03	b	c	<0.13	10.5	1.0	10.5	<1.0
1,617	a	510	6.9	3.10x10⁵	<0.10	<0.03	b	c	<0.13	6.9	1.0	6.9	<1.0
1,717	a	510	4.7	1.54x10⁵	<0.10	<0.03	b	c	<0.13	4.7	1.0	4.7	<1.0
1,812	a	502	3.4	7.5[illegible]x10⁴	<0.10	<0.03	b	c	<0.13	3.4	1.0	3.4	<1.0
1,909	a	502	2.4	4.10x10⁴	<0.10	<0.03	b	c	<0.13	2.4	1.0	2.4	<1.0
2,007	a	502	1.0	2.05x10⁴	<0.10	<0.03	b	c	<0.13	1.6	1.0	1.6	<1.0

[a] Unknown.
[b] NBS film holders attached to aluminum stakes.
[c] Negligible.

(U) TABLE 3.30 SCEL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 3 (TUMBLER III)

Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Au Flux	Au Thermal Correc-tion	Fast Correc-tion	Shield Type	Shield Correc-tion	Total Correc-tion	Cor-rected Gamma Dose	Atten-uation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,170	a	548-0	2,700	6.69x10⁸ c	7.6	72	b	c	79.6	2,620	1.0	2,620	26
1,195	a	548-0	2,400	5.68x10⁸ c	6.5	62	b	c	68.5	2,330	1.0	2,330	23
1,210	a	[illegible]	2,350	5.31x10⁸ c	6.0	59	b	c	65.0	2,290	1.0	2,290	21
1,240	a	548-0	2,200	4.[illegible]x10⁸ c	5.4	52	b	c	57.4	2,140	1.0	2,140	18
1,250	a	548-0	1,950	4.21x10⁸ c	4.8	48	b	c	52.8	1,900	1.0	1,900	17
1,270	a	548-0	1,830	3.75x10⁸ c	4.3	41	b	c	45.3	1,790	1.0	1,790	16
1,280	a	548-0	1,520	3.50x10⁸ c	3.9	41	b	c	44.9	1,480	1.0	1,480	15
1,300	a	548-0	1,422	2.2[illegible]x10⁸ c	2.5	27	b	c	29.5	1,370	1.0	1,370	3.6
1,420	a	548-0	1,115	1.57x10⁸ c	1.8	19	b	c	20.8	[illegible]	1.0	1,100	6.6
1,480	a	1290	895	1.11x10⁸ c	[illegible]	2.3	b	c	4.6	[illegible]	1.0	890	4.4
1,540	a	1290	630	7.03x10⁷	1.6	1.7	b	c	1.3	[illegible]	1.0	[illegible]	2.[illegible]
1,610	a	1290	470	5.2[illegible]x10⁷	1.1	1.2	b	c	[illegible]	468	1.0	468	[illegible]
1,670	a	1290	342	3.87x10⁷	0.80	0.89	b	c	1.69	340	1.0	340	1.2
[illegible]	a	1290	[illegible]	2.09x10⁷	0.40	0.50	b	c	0.90	254	1.0	254	<1.2
[illegible]	a	1290	180	1.[illegible]x10⁷	0.30	0.15	b	c	[illegible]	181	1.0	181	<1.2
1,[illegible]20	a	1290	160	8.[illegible]x10⁶	[illegible]	0.2[illegible]	b	c	0.42	160	1.0	160	<1.2
[illegible]	a	1290	107	5.4[illegible]x10⁶	0.10	0.14	b	c	0.24	107	1.0	107	<1.2
[illegible]	a	1290	[illegible]	3.[illegible]x10⁶	<0.10	<0.14	b	c	<0.24	[illegible]	1.0	[illegible]	<1.2
2,1[illegible]	a	1290	[illegible]	2.1[illegible]x10⁶	<0.10	<0.14	b	c	<0.24	[illegible]	1.0	[illegible]	<1.2
2,2[illegible]		1290	45	9.[illegible]	<0.10	<0.14	b	c	<0.24	[illegible]	1.0	45	<1.2
[illegible]		1290	23	2.[illegible]	<0.10	<0.14	b	c	<0.24	23	1.0	23	<1.2
[illegible]		[illegible]	[illegible]	[illegible]	<0.10	<0.14	b	c	<0.24	[illegible]	1.0	[illegible]	<1.2

[a] Unknown.
[b] [illegible] film holders attached to aluminum stakes.
[c] Negligible.



(U)

Figure 3.22 ~~(S-RD)~~ Operation Tumbler-Snapper - Shot 2 (Tumbler II) - SCEL corrected gamma-dose-times-slant-range-squared versus slant-range (U).

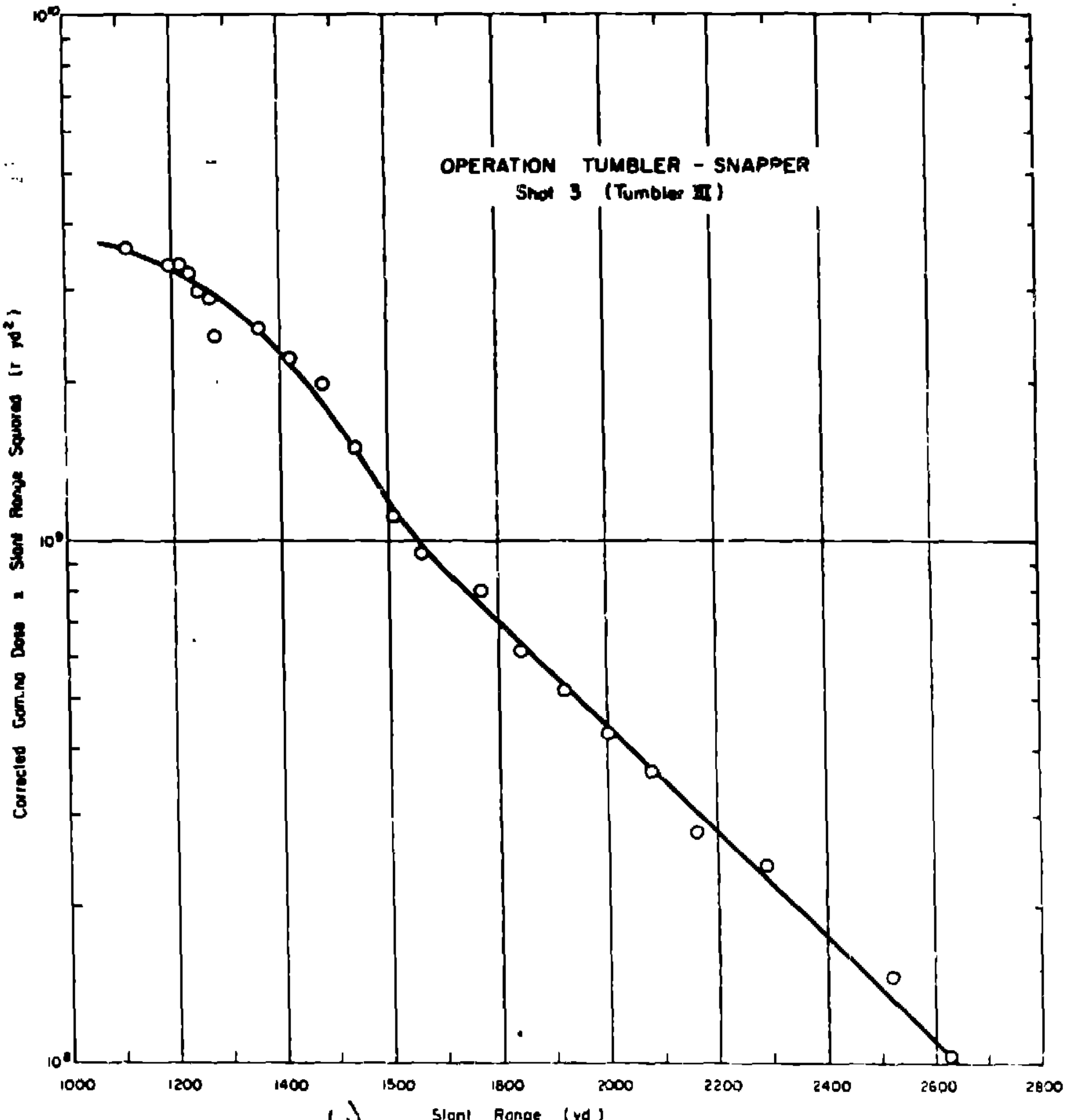


Figure 3.23 (U) ~~(S-RD)~~ Operation Tumbler-Snapper - Shot 3 (Tumbler III) - SCEL Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.31 SOIL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, Shot 4 (Snapper I)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,130	a	548-0	2,200	2.69×10^{13}	31	202	b	c	233	1,970	1.0	1,970	80
1,210	a	548-0	1,350	1.65×10^{13}	19	128	b	c	147	1,200	1.0	1,200	49
1,300	a	1290	900	9.[illegible]	19	20	b	c	39	861	1.0	861	39
1,395	a	1290	589	4.[illegible]	10	7.2	b	c	17.2	563	1.0	563	16
1,490	a	1290	435	2.7[illegible]	5.6	4.4	b	c	10.0	425	1.0	425	9.1
1,590	a	1290	316	1.46[illegible]	3.0	2.5	b	c	5.5	310	1.0	310	4.6
1,690	a	1290	226	7.[illegible]	1.6	1.4	b	c	3.0	223	1.0	223	2.3
1,765	a	606	150	4.22[illegible]	0.96	0.54	b	c	1.5	148	1.0	148	1.9
1,865	a	606	110	2.25[illegible]	0.51	0.32	b	c	0.83	109	1.0	109	1.0
1,960	a	606	75	1.23[illegible]	0.28	0.19	b	c	0.47	74	1.0	74	<1.0
2,065	a	606	52	9.2[illegible]	0.21	0.14	b	c	0.35	52	1.0	52	<1.0
2,170	a	606	39	5.51[illegible]	0.13	0.06	b	c	0.18	38	1.0	38	<1.0
2,260	a	606	28	1.74[illegible]	0.04	0.04	b	c	0.08	28	1.0	28	<1.0
2,370	a	606	19	9.75[illegible]	0.02	0.02	b	c	0.04	19	1.0	19	<1.0
2,470	a	510	13	5.[illegible]	<0.02	<0.02	b	c	<0.04	13	1.0	13	<1.0
2,580	a	510	10	2.65[illegible]	<0.02	<0.02	b	c	<0.04	10	1.0	10	<1.0
2,680	a	510	7.5	1.39[illegible]	<0.02	<0.02	b	c	<0.04	7.5	1.0	7.5	<1.0
2,790	a	510	5.0	6.91[illegible]	<0.02	<0.02	b	c	<0.04	5.0	1.0	5.0	<1.0
2,870	a	508	3.5	4.1[illegible]	<0.02	<0.02	b	c	<0.04	3.5	1.0	3.5	<1.0
2,970	a	[illegible]	5.0	[illegible]	<0.02	<0.02	b	c	<0.04	5.0	1.0	5.0	<1.0

[a] Unknown.
[b] NBS film holders attached to aluminum stakes.
[c] Negligible.

(U) TABLE 3.32 SOIL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, Shot 5 (Snapper II)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,200	a	548-0	1,580	9.[illegible]	11	90	b	c	101	1,480	1.0	1,480	26
1,300	a	1290	950	4.86[illegible]	10	7.8	b	c	17.8	932	1.0	932	14
1,400	a	1290	560	2.58[illegible]	5.3	4.4	b	c	9.7	550	1.0	550	7.7
1,500	a	1290	364	1.[illegible]	2.8	2.4	b	c	5.2	364	1.0	364	3.6
1,600	a	1290	[illegible]	[illegible]	1.5	1.2	b	c	2.7	269	1.0	269	1.3
1,700	a	1290	174	1.[illegible]	0.79	0.72	b	c	1.51	172	1.0	172	<1.3
1,800	a	606	116	2.04[illegible]	0.46	0.28	b	c	0.74	115	1.0	115	<1.3
1,900	a	606	75	1.10[illegible]	0.25	0.16	b	c	0.41	75	1.0	75	<1.3
2,000	a	606	52	5.70[illegible]	0.13	0.08	b	c	0.21	52	1.0	52	<1.3
2,100	a	606	36	3.0[illegible]	0.07	0.04	b	c	0.11	36	1.0	36	<1.3
2,200	a	606	24	1.62[illegible]	<0.07	<0.04	b	c	<0.11	24	1.0	24	<1.3
2,300	a	606	17	8.4[illegible]	<0.07	<0.04	b	c	<0.11	17	1.0	17	<1.3
2,400	a	510	[illegible]	4.[illegible]	<0.07	<0.04	b	c	<0.11	12	1.0	12	<1.3
2,500	a	510	9.0	2.40[illegible]	<0.07	<0.04	b	c	<0.11	9.0	1.0	9.0	<1.3
2,600	a	510	6.5	[illegible]	<0.07	<0.04	b	c	<0.11	6.5	1.0	6.5	<1.3
2,700	a	510	[illegible]	[illegible]	[illegible]	[illegible]	b	c	[illegible]	4.5	1.0	4.5	<1.3
2,800	a	[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	c	<0.11	[illegible]	1.0	3.0	<1.3
2,900	a	508	[illegible]	1.[illegible]	[illegible]	<0.04	b	c	<0.11	[illegible]	1.0	[illegible]	<1.3
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	<0.04	b	c	<0.11	[illegible]	1.0	[illegible]	<1.3

[a] [illegible]
[b] [illegible] film holders attached to aluminum stakes.
[c] [illegible]

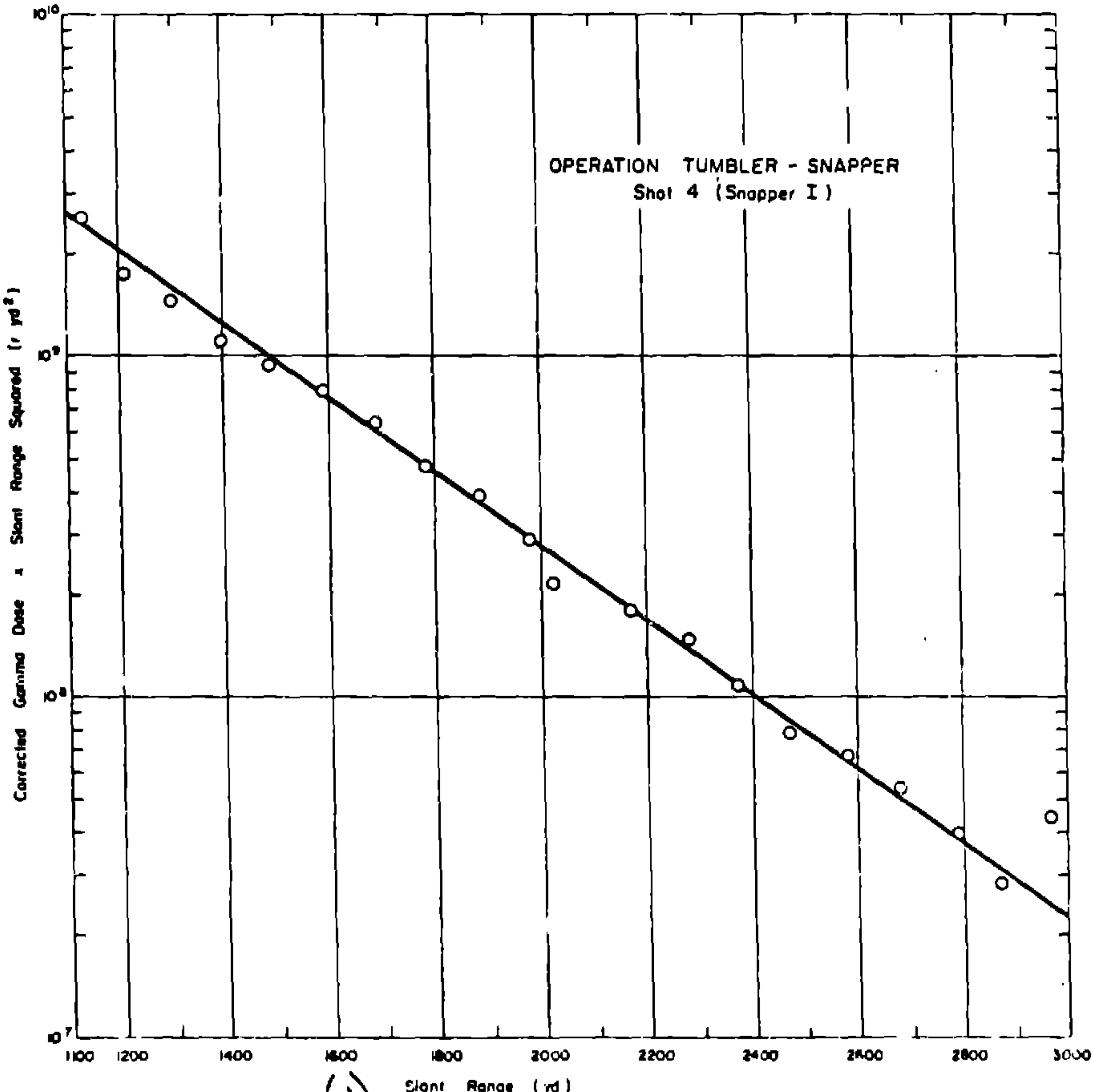


Figure 3.24 (U) ~~(S-RD)~~ Operation Tumbler-Snapper - Shot 4 (Snapper I) - SCEL corrected gamma-dose-times-slant-range-squared versus slant-range (U).

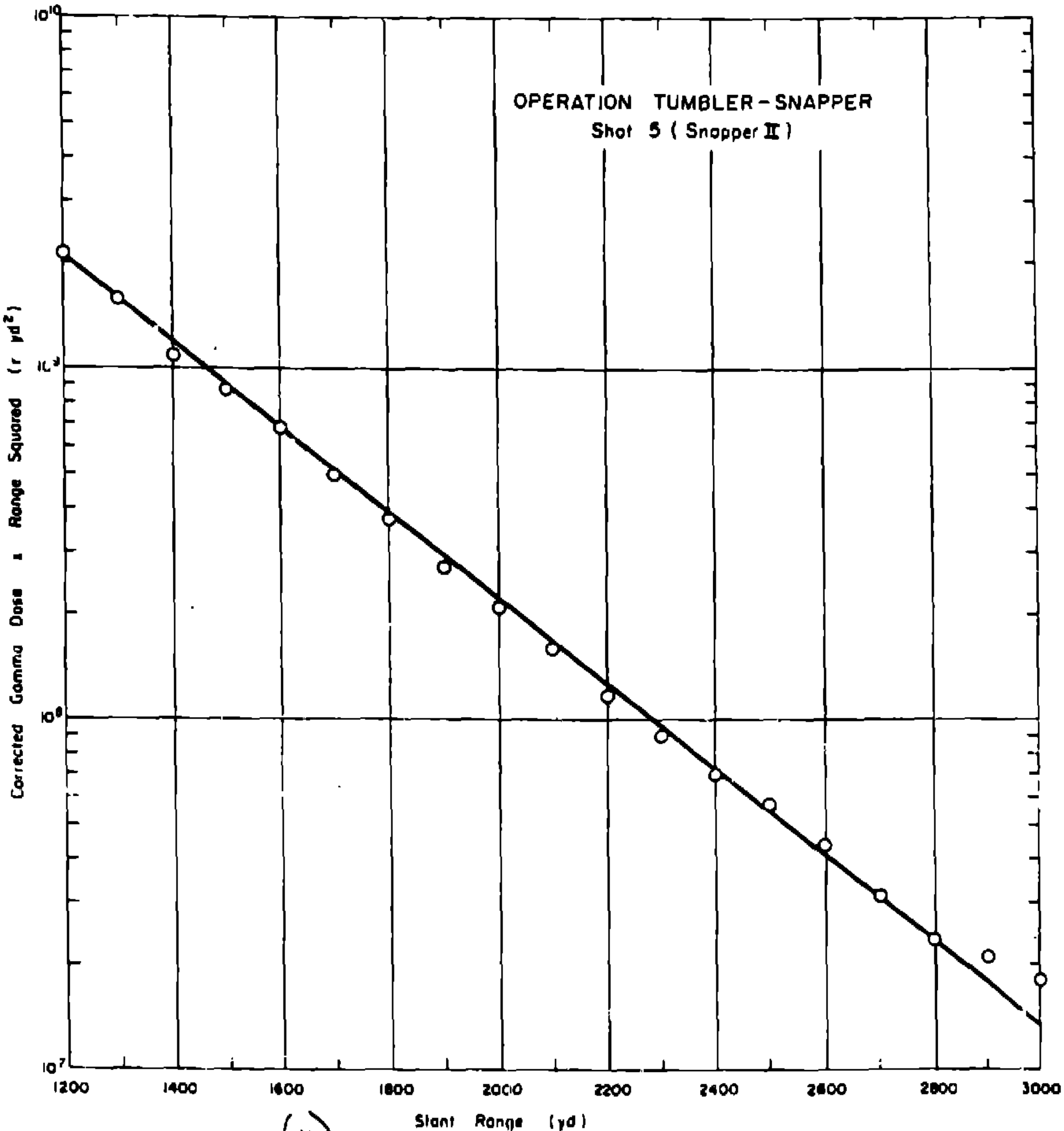


Figure 3.25 (U) ~~(S-RD)~~ Operation Tumbler-Snapper - Shot 5 (Snapper II) - SCEL Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3-33 SCEL INITIAL [illegible] - OPERATION TUMBLER-SNAPPER, SHOT 6 (SNAPPER III)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,165	a	1290	1,000	6.19x10[9]	13	10	b	c	23	971	1.0	977	13
1,265	a	1290	715	3.07x10[9]	6.7	5.5	b	c	12.2	703	1.0	703	8.1
1,365	a	1290	443	1.71x10[9]	3.5	3.0	b	c	6.5	436	1.0	436	3.8
1,465	a	1290	244	8.90x10[8]	1.8	1.6	b	c	3.4	241	1.0	241	2.2
1,565	a	606	160	4.7[illegible]x10[8]	1.1	0.57	b	c	1.67	158	1.0	158	1.1
1,665	a	606	98	3.[illegible]	0.88	0.31	b	c	1.19	97	1.0	97	<1.1
1,765	a	606	68	[illegible]	0.50	0.17	b	c	0.47	67	1.0	67	<1.1
1,865	a	606	43	[illegible]	0.16	0.09	b	c	0.25	43	1.0	43	<1.1
1,965	a	606	33	3.[illegible]x10[8]	0.08	0.05	b	c	0.13	30	1.0	30	<1.1
2,065	a	606	21	1.[illegible]	0.04	0.03	b	c	0.07	21	1.0	21	<1.1
2,165	a	606	16	9.73x10[7]	0.02	0.02	b	c	0.04	16	1.0	16	<1.1
2,265	a	606	12	5.14x10[7]	<0.02	<0.02	b	c	<0.04	12	1.0	12	<1.1
2,365	a	510	9.0	2.64x10[7]	<0.02	<0.02	b	c	<0.04	9.0	1.0	9.0	<1.1
2,465	a	510	6.0	1.39x10[7]	<0.02	<0.02	b	c	<0.04	6.0	1.0	6.0	<1.1
2,565	a	510	4.3	7.37x10[6]	<0.02	<0.02	b	c	<0.04	4.3	1.0	4.3	<1.1
2,665	a	508	3.0	3.8[illegible]x10[6]	<0.02	<0.02	b	c	<0.04	3.0	1.0	3.0	<1.1

[a] Unknown.
[b] NBS film holders attached to aluminum stakes.
[c] Negligible.

(U) TABLE 3-34 SCEL INITIAL GAMMA [illegible] - OPERATION TUMBLER-SNAPPER, SHOT 7 (SNAPPER IV)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,200	a	1290	950	1.25x10[9]	2.6	2.4	b	c	5.0	945	1.0	945	3.1
1,300	a	1290	720	6.[illegible]x10[8]	1.5	1.2	b	c	2.5	717	1.0	717	2.0
1,400	a	1290	520	3.[illegible]x10[8]	0.65	0.72	b	c	1.37	519	1.0	519	1.0
1,500	a	1290	330	[illegible]x10[8]	0.52	0.39	b	c	0.71	329	1.0	329	0.4
1,600	a	1290	179	8.0[illegible]x10[8]	0.16	0.17	b	c	0.28	179	1.0	179	<0.4
1,700	a	606	127	[illegible]x10[8]	0.09	0.07	b	c	0.16	127	1.0	127	<0.4
1,800	a	606	85	2.[illegible]x10[8]	0.05	0.04	b	c	0.09	85	1.0	85	<0.4
1,900	a	606	54	1.[illegible]x10[8]	0.02	0.02	b	c	0.06	54	1.0	54	<0.4
2,000	a	606	[illegible]	4.[illegible]x10[7]	0.01	0.01	b	c	0.02	[illegible]	1.0	30	<0.4
2,100	a	606	33	2.[illegible]	<0.01	<0.01	b	c	<0.02	[illegible]	1.0	[illegible]	<0.4
2,200	a	606	20	1.[illegible]x10[7]	<0.01	<0.01	b	c	<0.02	20	1.0	20	<0.4
2,300	a	606	12	6.[illegible]x10[7]	<0.01	<0.01	b	c	<0.02	12	1.0	1[illegible]	<0.4
2,400	a	510	[illegible]	3.[illegible]x10[7]	<0.01	<0.01	b	c	<0.02	9	1.0	9	<0.4
2,500	a	510	[illegible]	[illegible]	<0.01	<0.01	b	c	<0.02	6.8	1.0	6.0	<0.4
2,600	a	510	6.8	[illegible]	<0.01	<0.01	b	c	<0.02	4.9	1.0	4.3	<0.4
2,700	a	510	4.3	[illegible]x10[7]	<0.01	<0.01	b	c	<0.02	3.3	1.0	3.3	<0.4
2,800	a	[illegible]	3.3	[illegible]	<0.01	<0.01	b	c	<0.02	2.5	1.0	2.5	<0.4
2,900	a	[illegible]	[illegible]	[illegible]	<0.01	<0.01	b	c	<0.02	1.9	1.0	1.9	<0.4
3,000	a	[illegible]	1.9	9.[illegible]x10[6]	<0.01	<0.01	b	c	<1.0	1.[illegible]	1.0	1.5	<0.4
[illegible]	a	[illegible]	1.5	4.[illegible]x10[6]	<0.01	<0.01	b						

[a] Negligible.
[b] [illegible] film holders [illegible] attached to [illegible]

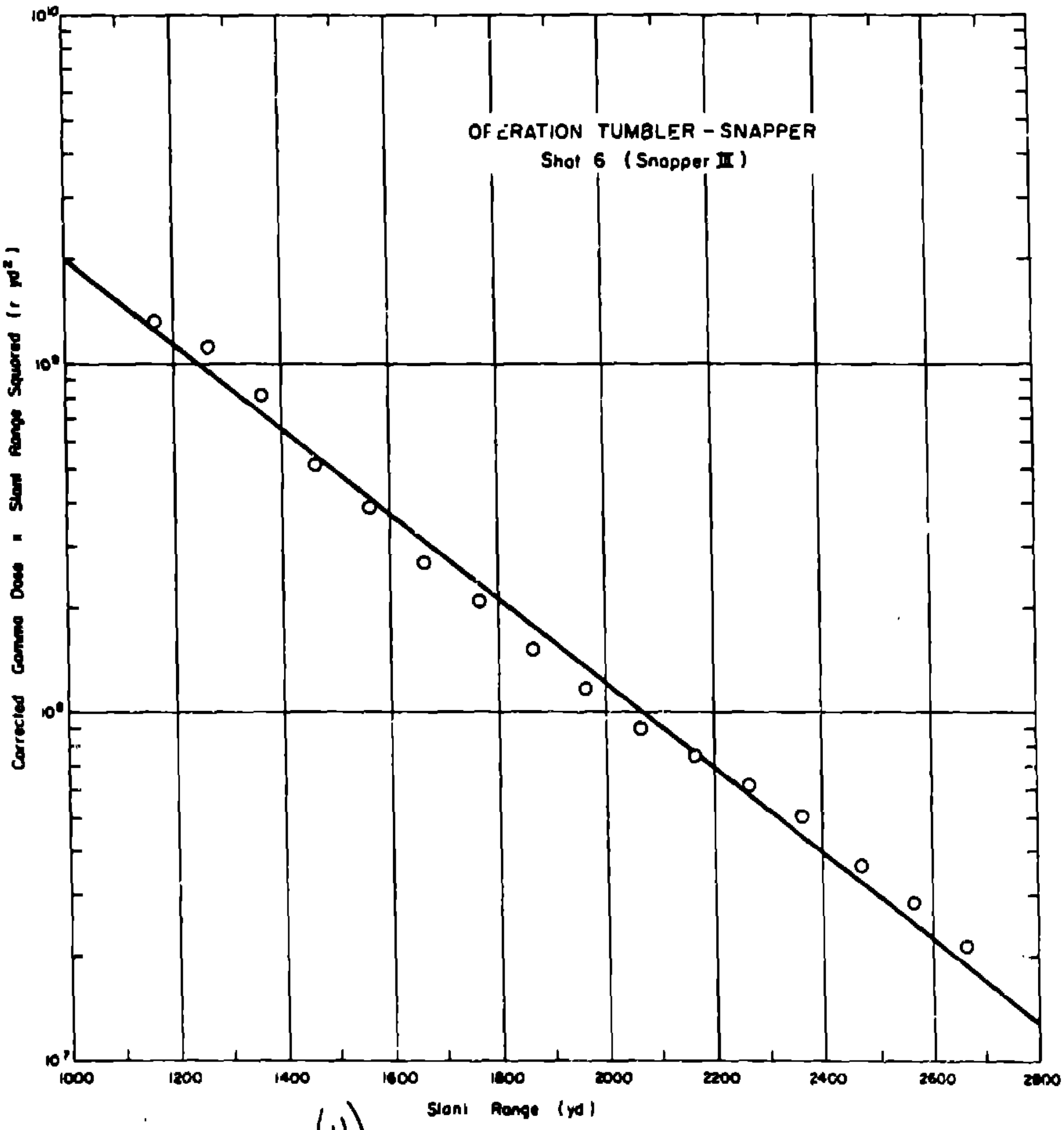


Figure 3.26 ~~(S-RD)~~ (U) Operation Tumbler-Snapper - Shot 6 (Snapper III) - SCEL Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

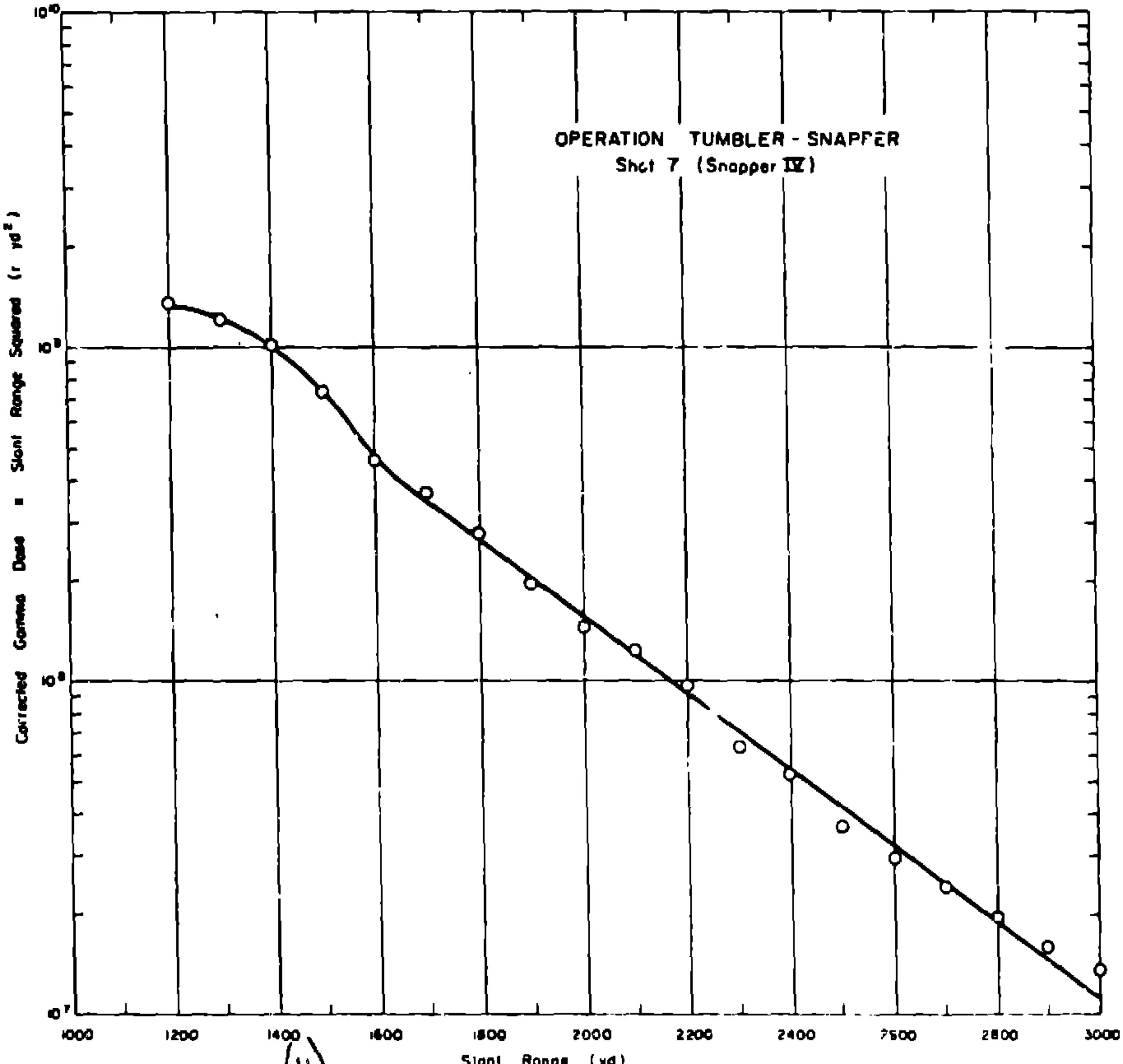


Figure 3.27 ~~(S-RD)~~ (U) Operation Tumbler-Snapper - Shot 7 (Snapper IV) - SCEL Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

(S-RD) TABLE 3.[illegible] NRDL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 8 (CHAPTER V)

Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Neutron Flux Au	Au Thermal Correc-tion	Fast Correc-tion	Shield Type	Shield Correc-tion	Total Correc-tion	Cor-rected Gamma Dose	Atten-uation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,200	a	548-0	1,500	1.75×10^{11}	2.0	10	b	c	12.0	1,490	1.0	1,490	3.4
1,300	a	1290	875	9.44×10^{10}	1.9	0.89	b	c	2.79	872	1.0	872	1.6
1,400	a	1290	575	5.23×10^{10}	1.1	0.49	b	c	1.59	573	1.0	573	0.8
1,500	a	1290	400	2.54×10^{10}	0.60	0.26	b	c	0.86	399	1.0	399	<0.8
1,600	a	1290	255	1.64×10^{10}	0.34	0.15	b	c	0.49	254	1.0	254	<0.8
1,700	a	606	126	8.98×10^{9}	0.20	0.05	b	c	0.25	126	1.0	126	<0.8
1,800	a	606	102	4.90×10^{9}	0.11	0.03	b	c	0.14	102	1.0	102	<0.8
1,900	a	606	67	2.63×10^{9}	0.06	0.02	b	c	0.08	67	1.0	67	<0.8
2,000	a	606	47	1.50×10^{9}	0.03	0.01	b	c	0.04	47	1.0	47	<0.8
2,100	a	606	34	8.18×10^{8}	<0.03	<0.01	b	c	<0.04	34	1.0	34	<0.8
2,200	a	606	23	4.45×10^{8}	<0.03	<0.01	b	c	<0.04	23	1.0	23	<0.8
2,300	a	606	17	2.46×10^{8}	<0.03	<0.01	b	c	<0.04	17	1.0	17	<0.8
2,400	a	510	12.5	1.34×10^{8}	<0.03	<0.01	b	c	<0.04	12.5	1.0	12.5	<0.8
2,500	a	510	9.5	7.45×10^{7}	<0.03	<0.01	b	c	<0.04	9.5	1.0	9.5	<0.8
2,600	a	510	6.5	4.06×10^{7}	<0.03	<0.01	b	c	<0.04	6.5	1.0	6.5	<0.8
2,700	a	510	4.8	2.20×10^{7}	<0.03	<0.01	b	c	<0.04	4.8	1.0	4.8	<0.8
2,800	a	508	3.6	1.2×10^{7}	<0.03	<0.01	b	c	<0.04	3.6	1.0	3.6	<0.8
2,900	a	505	2.7	6.6×10^{6}	<0.03	<0.01	b	c	<0.04	2.7	1.0	2.7	<0.8
3,000	a	502	2.0	3.7×10^{6}	<0.03	<0.01	b	c	<0.04	2.0	1.0	2.0	<0.

[a] Unknown.
[b] NBS film holders attached to aluminum stakes.
[c] Negligible.

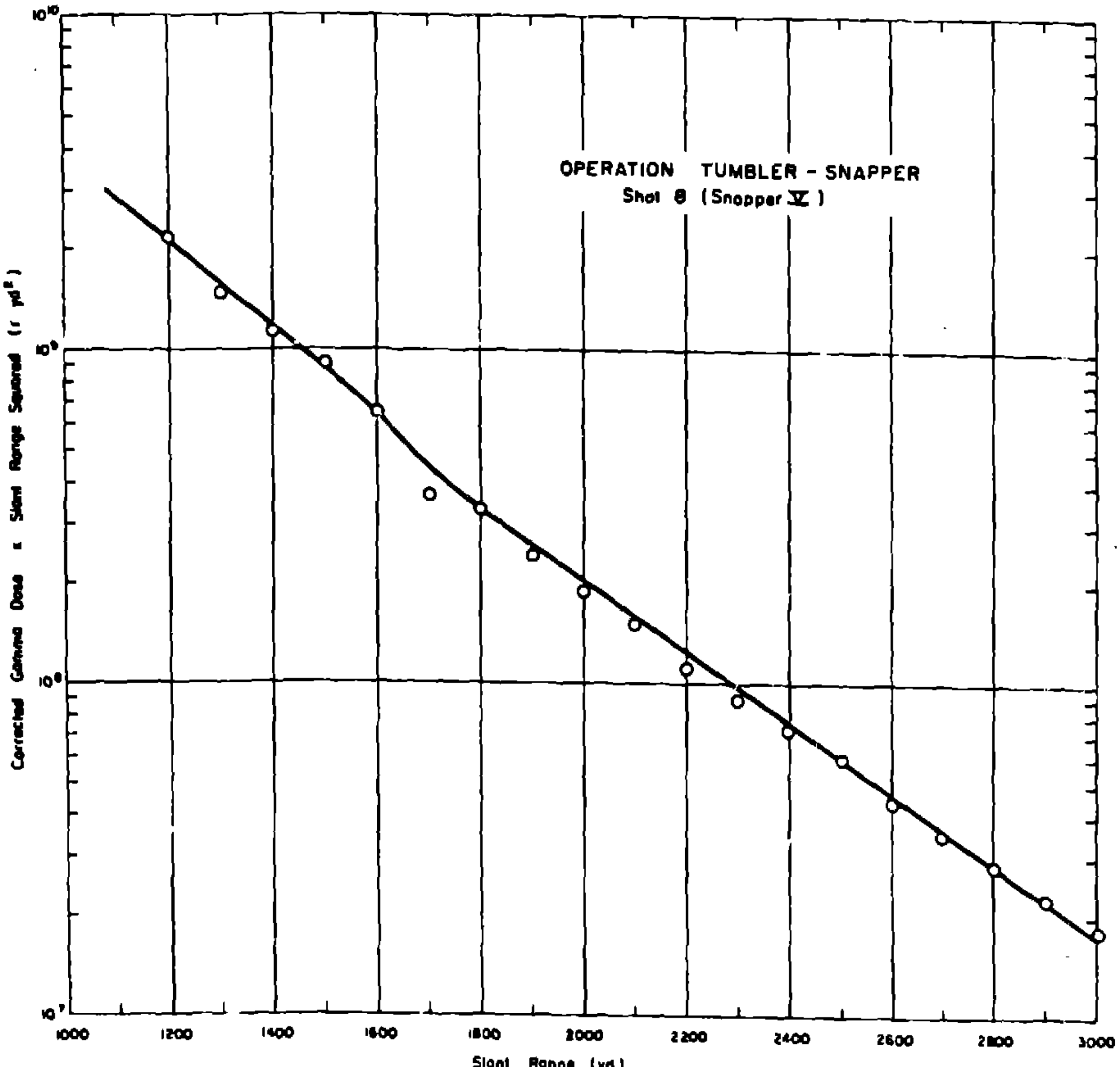


Figure 3.28 (U) ~~(S-RD)~~ Operation Tumbler-Snapper - Shot 8 (Snapper V) - SCEL Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

TABLE 3.36 LASL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 2 (TUMBLER II)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm^2	
590	a	548-0	1,480	3.74×10^{9} *	b
750	a	Adlux	550	1.23×10^{9} *	b
930	a	606	245	3.51×10^{8}	b
1,120	a	606	100	9.48×10^{8}	b
1,310	a	606	46	2.57×10^{8}	b
1,400	a	510 and 606	30	$1.[illegible]\times10^{8}$	b
1,500	a	510 and 606	21	7.02×10^{7}	b
1,600	a	510 and 606	14.4	$3.5[illegible]\times10^{7}$	b
1,600	a	510 and 606	14.8	3.51×10^{7}	b
1,690	a	510 and 606	10.4	1.87×10^{7}	b
1,790	a	510 and 502	7.3	9.36×10^{6}	b
1,790	a	510 and 502	7.8	9.56×10^{6}	b
1,890	a	510 and 502	4.8	4.68×10^{6}	b
1,890	a	510 and 502	5.1	4.08×10^{6}	b
1,990	a	510 and 502	3.5	2.32×10^{6}	b
1,950	a	510 and 502	3.5	2.32×10^{6}	b
2,090	a	502	2.5	1.16×10^{6}	b
2,180	a	502	1.5	6.74×10^{5}	b
2,280	a	502	1.1	3.08×10^{5}	b
2,380	a	502	0.67	1.54×10^{5}	b
2,480	a	502	[illegible]	$7.4[illegible]\times10^{4}$	b
2,560	a	502	[illegible]	$3.8[illegible]\times10^{4}$	b
2,680	a	502	[illegible]	1.91×10^{4}	b
2,700	a	502	0.4	$<1\times10^{4}$	b
2,890	a	[illegible]	[illegible]	[illegible]	b
2,990	a	502	[illegible]	[illegible]	b
3,070	a	502	[illegible]	[illegible]	b

[a] Unknown.

[b] All film holders attached to angle-iron stake.

(U)

TABLE 3.37 LASL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 3 (TUMBLER III)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm^2	
1,570	a	606	700	6.60×10^{8}	b
1,720	a	606	375	2.79×10^{8}	b
1,790	a	606	290	1.84×10^{8}	b
1,870	a	606	213	1.14×10^{8}	b
1,950	a	606	170	7.21×10^{7}	b
2,030	a	606	120	4.54×10^{7}	b
2,110	a	606	96	2.79×10^{7}	b
2,200	a	606	77	1.69×10^{7}	b
2,280	a	606	53	1.05×10^{7}	b
2,370	a	606	38	6.14×10^{6}	b
2,460	a	510 and 606	34	3.68×10^{6}	b
2,550	a	510 and 606	27	2.15×10^{6}	b
2,640	a	510 and 606	20	1.29×10^{6}	b
2,730	a	510 and 606	15	7.68×10^{5}	b
2,820	a	510 and 606	11	4.51×10^{5}	b
2,910	a	510 and 502	8.4	2.64×10^{5}	b
3,000	a	510 and 502	7.1	1.58×10^{5}	b
3,100	a	510 and 502	5.5	8.84×10^{4}	b
3,190	a	510 and 502	4.0	5.22×10^{4}	b
3,290	a	502	[illegible]	$2.9[illegible]\times10^{4}$	b
3,380	a	502	2.1	1.94×10^{4}	b
3,470	a	502	1.7	8.47×10^{3}	b
3,560	a	502	1.35	5.15×10^{3}	b
3,660	a	502	1.00	$4.0[illegible]\times10^{3}$	b
3,740	a	502	0.72	$2.3[illegible]\times10^{3}$	b
3,850	a	502	[illegible]	$<1\times10^{3}$	b
3,940	a	502	[illegible]	$<1\times10^{3}$	b
4,060	a	502	[illegible]	$<1\times10^{3}$	b

[a] Unknown.

[b] All film holders attached to angle-iron stake.

(U) TABLE [illegible] LASL INITIAL [illegible] OPERATION TUMBLER-SNAPPER, [illegible] (CHAPTER I)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	[illegible]	Shield Type
yd			r	n/cm²	
1,400	a	540-D	~[illegible]	4.90×10^{10}	b
1,500	a	Adlux	600	2.57×10^{10}	b
1,590	a	Adlux	400	1.46×10^{10}	b
1,690	a	Adlux	280	7.65×10^{9}	b
1,790	a	606	190	4.07×10^{9}	b
1,750	a	606	210	4.07×10^{9}	b
1,890	a	606	150	2.21×10^{9}	b
1,850	a	606	140	2.21×10^{9}	b
1,980	a	606	90	1.24×10^{9}	b
1,980	a	606	100	1.24×10^{9}	b
2,080	a	606	74	6.39×10^{8}	b
2,080	a	606	70	6.39×10^{8}	b
2,160	a	606	52	3.56×10^{8}	b
2,180	a	606	51	3.56×10^{8}	b
2,260	a	606	37	1.79×10^{8}	b
2,380	a	606 and 510	31	9.41×10^{7}	b
2,380	a	606 and 510	27	9.41×10^{7}	b
2,480	a	606 and 510	22	4.99×10^{7}	b
2,490	a	606 and 510	22	4.99×10^{7}	b
2,570	a	606 and 510	17	2.63×10^{7}	b
2,580	a	606 and 510	14	2.63×10^{7}	b
2,680	a	606 and 510	11	1.38×10^{7}	b
2,680	a	606 and 510	11.7	1.38×10^{7}	b
2,780	a	606 and 510	8.5	7.30×10^{6}	b
2,780	a	510 and 502	7.0	7.30×10^{6}	b
2,870	a	510 and 502	6.7	4.13×10^{6}	b
2,870	a	510 and 502	6.5	4.13×10^{6}	b
2,970	a	510 and 502	5.1	2.21×10^{6}	b
2,970	a	510 and 502	5.4	2.21×10^{6}	b
3,070	a	510 and 502	3.5	1.15×10^{6}	b
3,070	a	510 and 502	3.5	1.15×10^{6}	b
3,170	a	502	2.[illegible]	[illegible]	b
3,170	a	502	2.[illegible]	[illegible]	b
3,270	a	502	1.7	[illegible]	b
3,370	a	502	1.5	1.07×10^{5}	b
3,470	a	502	1.17	[illegible]	b
3,570	a	502	0.[illegible]	[illegible]	b
3,670	a	502	0.[illegible]	[illegible]	b
3,770		502	0.[illegible]	[illegible]	b
3,870	a	[illegible]	[illegible]	[illegible]	b

a Unknown.

[illegible]

(U) TABLE 3.[illegible] LASL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT [illegible] (CHAPTER II)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm²	
1,300	a	Adlux	705	4.86×10^{10}	b
1,400	a	Adlux	455	2.56×10^{10}	b
1,500	a	Adlux	[illegible]	1.36×10^{10}	b
1,600	a	606	21[illegible]	7.36×10^{9}	b
1,600	a	606	[illegible]	7.36×10^{9}	b
1,700	a	606	1[illegible]	3.69×10^{9}	b
1,700	a	606	1[illegible]	3.69×10^{9}	b
1,800	a	606	100	2.04×10^{9}	b
1,800	a	606	90	2.04×10^{9}	b
1,900	a	606	71	1.10×10^{9}	b
1,900	a	606	65	1.10×10^{9}	b
2,000	a	606	[illegible]	5.76×10^{8}	b
2,000	a	606	50	5.76×10^{8}	b
2,100	a	606 and 510	30	3.05×10^{8}	b
2,200	a	606 and 510	29	1.62×10^{8}	b
2,200	a	606 and 510	24	1.62×10^{8}	b
2,300	a	606 and 510	21	8.46×10^{7}	b
2,300	a	606 and 510	19	8.46×10^{7}	b
2,400	a	606 and 510	12.6	4.44×10^{7}	b
2,400	a	606 and 510	15	4.44×10^{7}	b
2,500	a	606 and 510	10.0	2.40×10^{7}	b
2,500	a	510 and 502	10.9	2.40×10^{7}	b
2,600	a	510 and 502	5.0	1.25×10^{7}	b
2,600	a	510 and 502	5.2	$<1.25 \times 10^{7}$	b
2,700	a	510 and 502	4.9	$<1.25 \times 10^{7}$	b
2,700	a	510 and 502	5.8	$<1.25 \times 10^{7}$	b
2,800	a	510 and 502	4.5	$<1.25 \times 10^{7}$	b
2,800	a	510 and 502	4.4	$<1.25 \times 10^{7}$	b
2,900	a	502	[illegible]	$<1.25 \times 10^{7}$	b
2,900	a	502	[illegible]	$<1.25 \times 10^{7}$	b
3,000	a	502	[illegible]	$<1.25 \times 10^{7}$	b
3,000	a	502	[illegible]	$<1.25 \times 10^{7}$	b
3,100	a	502	1.[illegible]	$<1.25 \times 10^{7}$	b
3,200	a	502	1.[illegible]	$<1.25 \times 10^{7}$	b
3,300	a	502	0.[illegible]	$<1.25 \times 10^{7}$	b
3,400	a	502	0.[illegible]	$<1.25 \times 10^{7}$	b
3,500	a	502	[illegible]	$<1.25 \times 10^{7}$	b
3,600	a	502	[illegible]	$<1.25 \times 10^{7}$	b
3,700	a	502	0.[illegible]	$<1.25 \times 10^{7}$	b

a Unknown.

b Gold film had been selected for [illegible]

(U)

(~~S-RD~~) TABLE 3.40 LASL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 6 (SNAPPER III)

Blast Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm²	
1,500	a	Adlux	410	1.58×10^{8}	b
1,600	a	Adlux	270	[illegible]	b
1,700	a	606	180	4.00×10^{8}	b
1,800	a	606	130	2.00×10^{8}	b
1,900	a	606	96	1.00×10^{8}	b
1,900	a	606	91	1.00×10^{8}	b
2,000	a	606	70	4.88×10^{7}	b
2,000	a	606	65	4.88×10^{7}	b
2,100	a	606	44	2.44×10^{7}	b
2,100	a	606	44	2.44×10^{7}	b
2,200	a	606 and 510	31	1.22×10^{7}	b
2,200	a	606 and 510	33	1.2[illegible]$\times10^{7}$	b
2,300	a	606 and 510	22	$<1\times10^{7}$	b
2,300	a	606 and 510	22	$<1\times10^{7}$	b
2,400	a	606 and 510	16	$<1\times10^{7}$	b
2,400	a	606 and 510	16	$<1\times10^{7}$	b
2,500	a	606 and 510	11	$<1\times10^{7}$	b
2,500	a	606 and 510	12	$<1\times10^{7}$	b
2,[illegible]	a	510 and 502	8.1	$<1\times10^{7}$	b
2,600	a	510 and 502	8.[illegible]	$<1\times10^{7}$	b
2,700	a	510 and 502	5.7	$<1\times10^{7}$	b
2,700	a	510 and 502	6.0	$<1\times10^{7}$	b
2,800	a	510 and 502	4.1	$<1\times10^{7}$	b
2,800	a	510 and 502	4.[illegible]	$<1\times10^{7}$	b
2,900	a	502	3.0	$<1\times10^{7}$	b
2,900	a	502	2.9	$<1\times10^{7}$	b
3,000	a	502	2.1	$<1\times10^{7}$	b
3,100	a	502	1.7	$<1\times10^{7}$	b
3,200	a	502	1.2	$<1\times10^{7}$	b
3,300	a	502	1.1	$<1\times10^{7}$	b
3,400	a	502	0.85	$<1\times10^{7}$	b
3,500	a	502	0.64	$<1\times10^{7}$	b
3,600	a	502	0.51	$<1\times10^{7}$	b
3,700	a	502	0.47	$<1\times10^{7}$	b
3,800	a	502	[illegible]	$<1\times10^{7}$	b
3,900	a	502	0.[illegible]	$<1\times10^{7}$	b
4,000	a	502	0.17	$<1\times10^{7}$	b

[a] Unknown.
[b] All film holders attached to angle-iron stake.

(U)

(~~S-RD~~) TABLE 3.41 LASL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 7 (SNAPPER V)

Blast Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Neutron Flux	Shield Type
yd			r	n/cm²	
1,410	a	Adlux	490	4.96×10^{8}	b
1,410	a	Adlux	490	4.96×10^{8}	b
1,610	a	606, Adlux	220	1.50×10^{8}	b
1,610	a	606	210	1.50×10^{8}	b
1,610	a	606	220	1.50×10^{8}	b
1,610	a	606	210	1.50×10^{8}	b
1,810	a	606	105	4.67×10^{8}	b
1,810	a	606	100	4.67×10^{8}	b
1,810	a	606	105	4.67×10^{8}	b
1,810	a	606	100	4.67×10^{8}	b
2,010	a	606	47	1.39×10^{8}	b
2,010	a	606	50	1.39×10^{8}	b
2,010	a	606	47	1.39×10^{8}	b
2,010	a	606	50	1.39×10^{8}	b
2,210	a	606 and 510	25	4.23×10^{7}	b
2,210	a	606 and 510	25	4.23×10^{7}	b
2,210	a	606 and 510	25	4.23×10^{7}	b
2,210	a	606 and 510	25	4.23×10^{7}	b
2,410	a	606 and 510	13	1.26×10^{7}	b
2,410	a	606 and 510	12.6	1.26×10^{7}	b
2,610	a	510 and 502	6.4	$<1\times10^{7}$	b
2,610	a	510 and 502	6.4	$<1\times10^{7}$	b
2,810	a	502	3.4	$<1\times10^{7}$	b
2,810	a	502	3.4	$<1\times10^{7}$	b
2,810	a	502	3.4	$<1\times10^{7}$	b
2,810	a	502	3.4	$<1\times10^{7}$	b
2,810	a	502	3.5	$<1\times10^{7}$	b
3,010	a	502	1.7	$<1\times10^{7}$	b
3,010	a	502	1.9	$<1\times10^{7}$	b
3,010	a	502	1.7	$<1\times10^{7}$	b
3,010	a	502	1.7	$<1\times10^{7}$	b
3,210	a	502	0.96	$<1\times10^{7}$	b
3,210	a	502	0.95	$<1\times10^{7}$	b
3,410	a	502	0.[illegible]	$<1\times10^{7}$	b
3,410	a	502	0.[illegible]	$<1\times10^{7}$	b
3,010	a	502	0.[illegible]	$<1\times10^{7}$	b
3,610	a	502	0.[illegible]	$<1\times10^{7}$	b
3,810	a	502	0.[illegible]	$<1\times10^{7}$	b
3,810	a	502	0.15	$<1\times10^{7}$	b

[a] Unknown.
[b] All film holders attached to angle-iron stake.

(U)

TABLE 3.[illegible] LASL INITIAL GAMMA DOSE DATA - OPERATION TUMBLER-SNAPPER, SHOT 8 (SNAPPER V)

Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm²	
1,500	a	Adlux	460	7.0×10^{8}	b
1,600	a	Adlux	310	3.7×10^{8}	b
1,700	a	606, Adlux	190	1.97×10^{8}	b
1,700	a	606, Adlux	190	1.97×10^{8}	b
1,800	a	606, Adlux	130	1.04×10^{8}	b
1,800	a	606, Adlux	140	1.04×10^{8}	b
1,900	a	606, Adlux	96	5.28×10^{8}	b
1,900	a	606, Adlux	96	5.28×10^{8}	b
2,000	a	606, Adlux	69	2.82×10^{8}	b
2,000	a	606, Adlux	66	2.82×10^{8}	b
2,100	a	606, Adlux	49	1.47×10^{8}	b
2,100	a	606, Adlux	49	1.47×10^{8}	b
2,200	a	606, 510	35	7.65×10^{7}	b
2,200	a	606, 510	35	7.65×10^{7}	b
2,300	a	606, 510	26	4.03×10^{7}	b
2,300	a	606, 510	26	4.03×10^{7}	b
2,400	a	606, 510	20	2.79×10^{7}	b
2,400	a	606, 510	16	2.75×10^{7}	b
2,500	a	606, 510	15	1.11×10^{7}	b
2,500	a	606, 510	15	1.11×10^{7}	b
2,600	a	606, 510	10	$<1 \times 10^{7}$	b
2,700	a	510, 502	7.7	$<1 \times 10^{7}$	b
2,800	a	510, 502	5.6	$<1 \times 10^{7}$	b
2,800	a	510, 502	5.4	$<1 \times 10^{7}$	b
2,900	a	510, 502	4.0	$<1 \times 10^{7}$	b
2,900	a	510, 502	1.9	$<1 \times 10^{7}$	b
3,000	a	502	3.1	$<1 \times 10^{7}$	b
3,000	a	502	3.0	$<1 \times 10^{7}$	b
3,100	a	502	2.4	$<1 \times 10^{7}$	b
3,100	a	502	2.3	$<1 \times 10^{7}$	b
3,200	a	502	1.7	$<1 \times 10^{7}$	b
3,200	a	502	1.6	$<1 \times 10^{7}$	b
3,300	a	502	[illegible]	$<1 \times 10^{7}$	b
3,400	a	502	0.96	$<1 \times 10^{7}$	b
3,500	a	502	0.72	$<1 \times 10^{7}$	b
3,600	a	502	[illegible]	$<1 \times 10^{7}$	b
3,700	a	502	0.49	$<1 \times 10^{7}$	b
[illegible]	a	502	0.31	$<1 \times 10^{7}$	b

a [illegible]

b [illegible]

(U) TABLE 3.43 SHOT INFORMATION - OPERATION IVY

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total	HE Thickness
			ft	kt	cm
Mike	31 Oct 1952 1914:59 GMT	Flora-Surface	0	1.04×10^4	[a]
King	16 Nov 1952 2330:GMT	Yvonne-Air	1480	540	43.97

[a] Not reported.

(U) TABLE 3.44 METEOROLOGICAL DATA - OPERATION IVY

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^{a}$
	mb	°K	$g/cm^3 \times 10^3$		
Mike	1,010.7	302.4	1.17	0.90	1.23
King	1,101.7	301	1.14	0.88	1.29

(U) (S-RD) TABLE 3.45 INITIAL GAMMA DOSE DATA - OPERATION IVY, SHOT MIKE

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose[a]	Neutron Flux Au	Shield Type	Attenuation Factor	Soil Contribution
yd			r	n/cm²			r
4,500	a	606	140±20	$<1x10^{6}$	b	1.0	0
4,800	a	606	150±30	$<1x10^{6}$	b	1.0	0
5,100	a	510	25±3	$<1x10^{6}$	b	1.0	0
5,500	a	510	18±1	$<1x10^{6}$	b	1.0	0
5,700	a	502	4.1±0.2	$<1x10^{6}$	b	1.0	0
5,800	a	502	[illegible] ±0.4	$<1x10^{6}$	b	1.0	0
5,900	a	606	14±1	$<1x10^{6}$	b	1.0	0
6,000	a	502	2.1±0.3	$<1x10^{6}$	b	1.0	0

[a] Does not include the error due to discrepancy in dropping time.
[a] Unknown.
[b] Aluminum drop gadget.

(U) (S-RD) TABLE 3.46 INITIAL GAMMA DOSE DATA - OPERATION IVY, SHOT KING

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au
yd			r	n/cm²
2,0?0	a	548-D	2100	[illegible]
2,120	a	1290	1640	[illegible]
2,2?0	a	290	960	[illegible]
2,320	a	1290	650	[illegible]
2,420	a	1290	400	[illegible]
2,510	a	1290	350	[illegible]
2,?10	a	1290	240	[illegible]
[illegible]	[illegible]	1290	175	[illegible]
[illegible]	[illegible]	606	140	[illegible]
2,9??	a	60?	[illegible]	[illegible]
3,01?	a	60?	67	[illegible]
3,100	a	60?	50	[illegible]
[illegible]	[illegible]	60?	[illegible]	[illegible]
4,400	[illegible]	60?	30	[illegible]
[illegible]	[illegible]	510	21	[illegible]
[illegible]	[illegible]	510	1	[illegible]
[illegible]	[illegible]	510	1	[illegible]
[illegible]	[illegible]	510	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6,0??		502	[illegible]	[illegible]
6,100	[illegible]	[illegible]	[illegible]	[illegible]
6,2??	[illegible]	[illegible]	[illegible]	[illegible]

Slant Range	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
2,0?0	0.06	27	b	1.?	[illegible]	2?70	1.0	2470	<0.1
2,120	0.57	2.?	b	0.5?	[illegible]	[illegible]	1.0	[illegible]	<0.1
2,2?0	0.2?	1.5	b	0.20	[illegible]	1100	1.0	1100	<0.1
2,320	0.08	0.8?	b	0.07	[illegible]	749	1.0	749	<0.1
2,420	0.03	0.5?	b	0.03	0.?8	559	1.0	559	<0.1
2,510	0.01	0.5?	b	0.01	0.?4	400	1.0	400	<0.1
2,?10	<0.01	<0.12	b	<0.01	<0.??	280	1.0	280	<0.1
[illegible]	<0.01	<0.3?	b	<0.01	[illegible]	200	1.0	200	<0.1
[illegible]	<0.01	<0.??	b	<0.01	[illegible]	1?0	1.0	1?0	<0.1
2,9??	<0.01	<0.3?	b	<0.0?	[illegible]	100	1.0	100	<0.1
3,01?	<0.01	<0.??	b	<0.01	[illegible]	77	1.0	77	<0.1
3,100	<0.01	<0.3?	b	<0.01	<0.44	5?	1.0	[illegible]	<0.1
[illegible]	<0.01	<0.4?	b	<0.01	[illegible]	[illegible]	1.0	[illegible]	<0.1
4,400	<0.01	<0.4?	b	<0.01	[illegible]	[illegible]	1.0	[illegible]	<0.1
[illegible]	<0.01	<0.??	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<0.1
[illegible]	<0.01	<0.4	b	[illegible]	[illegible]	17	[illegible]	17	<0.1
[illegible]	<0.01	<0.4?	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.1
[illegible]	<0.01	<0.??	b	<0.01	[illegible]	[illegible]	[illegible]	[illegible]	<0.1
[illegible]	<0.01	<0.3?	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.1
[illegible]	<0.01	<0.??	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.1
6,0??	<0.01	<0.4	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.1
6,100	<0.01	<0.4?	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.1
6,2??	<0.01	<0.3?	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.1

[illegible]

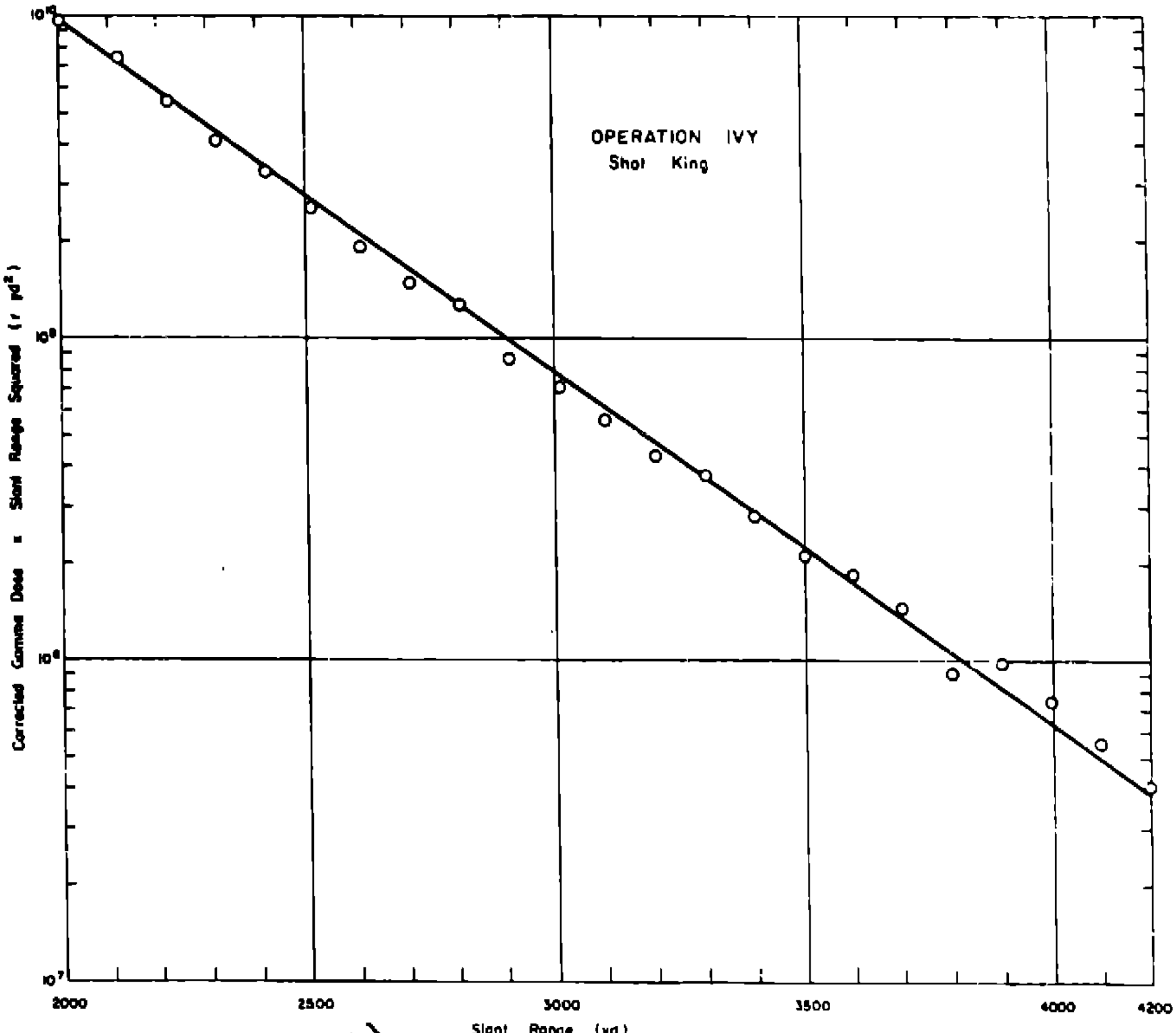


Figure 3.29 (U) ~~(S-RD)~~ Operation Ivy - Shot King - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) ~~(S-RD)~~ TABLE 3.47 SHOT INFORMATION - OPERATION UPSHOT-KNOTHOLE

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Total
			ft	kt
1 (Annie)	17 Mar 1953 1320:00 GMT	Area 3-Tower	300	17.1
2 (Nancy)	24 Mar 1953 1310:01 GMT	Area 4-Tower	300	24
3 (Ruth)	31 Mar 1953 1300:00 GMT	Area 7-5A-Tower	304.7	0.20
5 (Ray)	11 April 1953 1245:00 GMT	Area 4A-Tower	100	0.21
6 (Badger)	18 April 1953 1235:00 GMT	Area 2-Tower	300	25
7 (Simon)	25 April 1953 1230:00 GMT	Area 1-Tower	300	45
8 (Encore)	8 May 1953 1529:55 GMT	FF-Air	2425	26
9 (Harry)	19 May 1953 1205:00 GMT	Area 3A-Tower	300	32.3
10 (Grable)	25 May 1953 1530:00 GMT	FF-Gun	524	15
11 (Climax)	4 June 1953 1114:GMT	Area 7-3-Air	1334	60

(U) TABLE 3.48 METEOROLOGICAL DATA - OPERATION UPSHOT-KNOTHOLE

Shot	Pressure	Temperature	Density	p/p_s	$(p_s/p)^P$
	mb	°K	$g/cm^3 \times 10^3$		
1	876	275.7	1.10	0.85	1.39
2	870	282.9	1.06	0.82	1.49
3	873	277.4	1.09	0.84	1.42
5	869	272.7	1.11	0.86	1.35
6	862	280.7	1.06	0.82	1.49
7	870	284.7	1.06	0.82	1.49
8	900	299.7	1.04	0.80	1.56
9	874	287.3	1.05	0.81	1.53
10	901	297.8	[illegible]	0.84	[illegible]
11	867	296.3	[illegible]	0.71	[illegible]

(U) TABLE 3.49 SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 1 (ANNIE)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,300	a	1290	606	8.42×10^[illegible]	1.72	2.2	b	0.12	4.04	602	1.0	602	2.5
1,400	a	1290	390	[illegible]	0.95	1.2	b	0.080	2.23	388	1.0	388	1.3
1,500	a	1290	244	2.57×10^[illegible]	0.53	0.67	b	0.041	1.241	243	1.0	243	0.67
1,600	a	1290	170	1.44×10^[illegible]	0.29	0.35	b	0.026	0.666	169	1.0	169	<0.67
1,700	a	606	112	8.00×10^[illegible]	0.18	0.12	b	0.016	0.326	112	1.0	112	<0.67
1,800	a	606	70	4.42×10^[illegible]	0.10	0.07	b	0.008	0.178	70	1.0	70	<0.67
1,900	a	606	43	3.30×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	43	1.0	43	<0.67
2,000	a	606	29.5	1.39×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	29.5	1.0	29.5	<0.67
2,100	a	510	21.5	7.76×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	21.5	1.0	21.5	<0.67
2,200	a	510	15.1	4.29×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	15.1	1.0	15.1	<0.67
2,300	a	510	10.5	2.39×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	10.5	1.0	10.5	<0.67
2,400	a	510	7.3	1.32×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	7.3	1.0	7.3	<0.67
2,500	a	510	5.1	7.26×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	5.1	1.0	5.1	<0.67
2,600	a	508	3.5	4.04×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	3.5	1.0	3.5	<0.67
2,700	a	508	2.3	2.26×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	2.3	1.0	2.3	<0.67
2,800	a	508	1.7	1.24×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	1.7	1.0	1.7	<0.67
2,900	a	508	1.3	6.91×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	1.3	1.0	1.3	<0.67
3,000	a	508	0.95	3.88×10^[illegible]	<0.10	<0.07	b	<0.008	<0.178	0.95	1.0	0.95	<0.67

[a] Unknown.
[b] NBS film holders attached to aluminum stake.

(U) TABLE 3.50 SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 2 (NANCY)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,400	a	1290	660	1.38×10^[illegible]	2.82	2.9	b	0.20	5.92	[illegible]	1.0	654	[illegible]
1,500	a	1290	425	8.10×10^[illegible]	1.05	1.7	b	[illegible]	[illegible]	421	1.0	421	2.6
1,600	a	1290	272	[illegible]	0.90	0.94	b	0.06	1.90	270	1.0	270	1.6
1,700	a	[illegible]	182	[illegible]	0.52	0.53	b	0.04	1.09	181	1.0	181	0.87
1,800	a	[illegible]	120	1.45×10^[illegible]	0.33	0.19	b	[illegible]	0.56	119	1.0	119	<0.87
1,900	a	606	80	8.18×10^[illegible]	0.19	0.11	b	0.01	0.31	80	1.0	80	<0.87
2,000	a	606	52	[illegible]	0.11	0.06	b	0.008	0.178	52	1.0	52	<0.87
2,100	a	606	34	[illegible]	<0.11	<0.06	b	<0.008	<0.178	34	1.0	34	<0.87
2,200	a	510	22	[illegible]	<0.11	<0.06	b	<0.008	<0.178	22	1.0	22	<0.87
2,300	a	510	16	[illegible]	<0.11	<0.06	b	[illegible]	<0.178	16	1.0	16	<0.87
2,400	a	510	10.8	[illegible]	<0.11	[illegible]	b	[illegible]	<0.178	10.8	1.0	10.8	<0.87
2,500	a	510	7.7	[illegible]	<0.11	[illegible]	b	[illegible]	<0.178	7.7	1.0	7.7	<0.87
2,600	a	510	5.3	[illegible]	<0.11	[illegible]	b	[illegible]	[illegible]	5.3	1.0	5.3	<0.87
2,700	a	508	3.7	[illegible]	<0.11	[illegible]	b	[illegible]	<0.178	3.7	1.0	[illegible]	[illegible]
[illegible]	a	508	[illegible]	[illegible]	<0.11	[illegible]	b	[illegible]	[illegible]	2.65	1.0	[illegible]	[illegible]
[illegible]	a	508	1.9	[illegible]	<0.11	[illegible]	b	[illegible]	[illegible]	1.9	1.0	1.9	[illegible]

[a] [illegible]
[b] NBS film holders attached to aluminum stake.

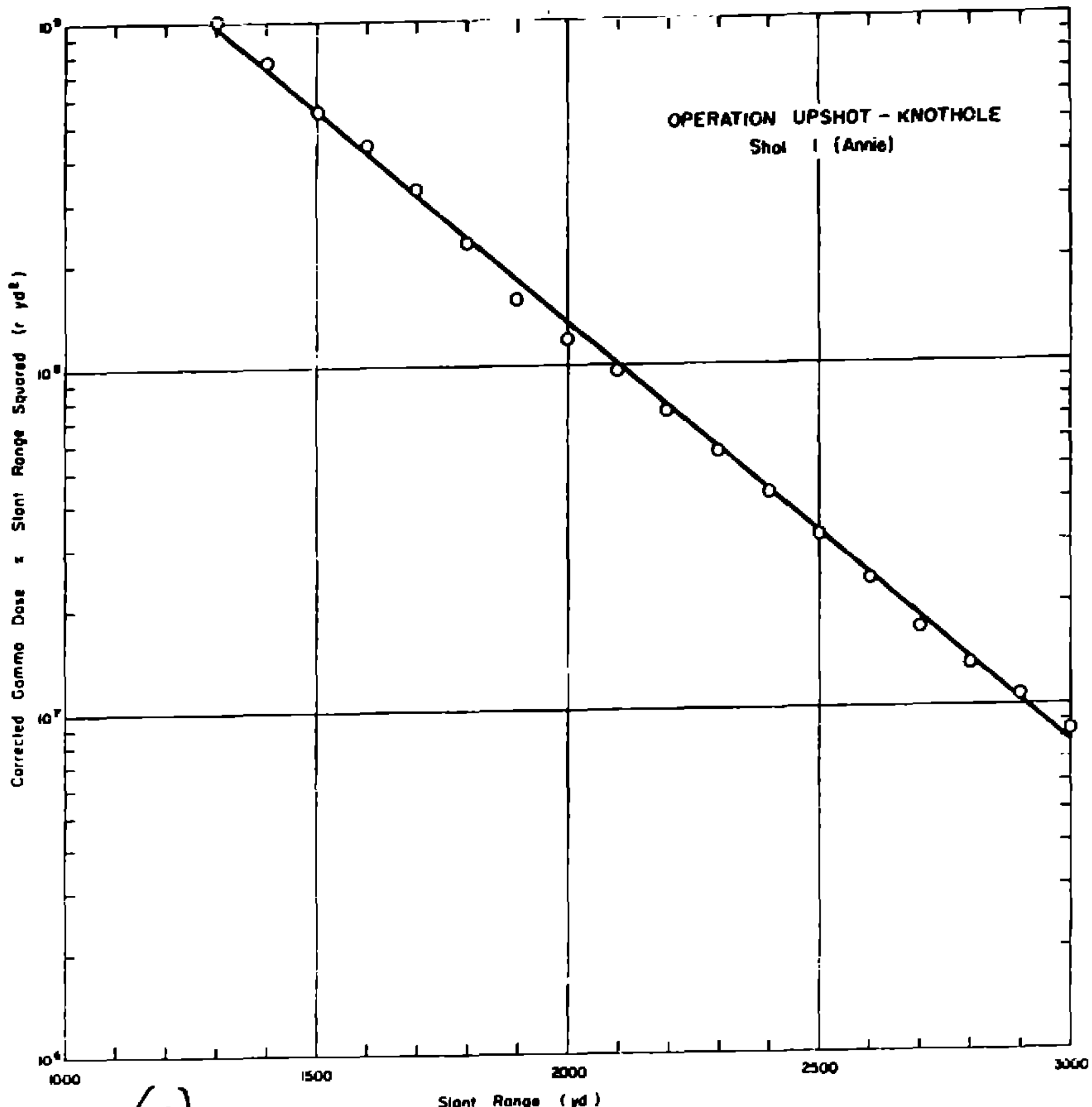


Figure 3.30 (~~S-RD~~) (U) Operation Upshot-Knothole - Shot 1 (Annie) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

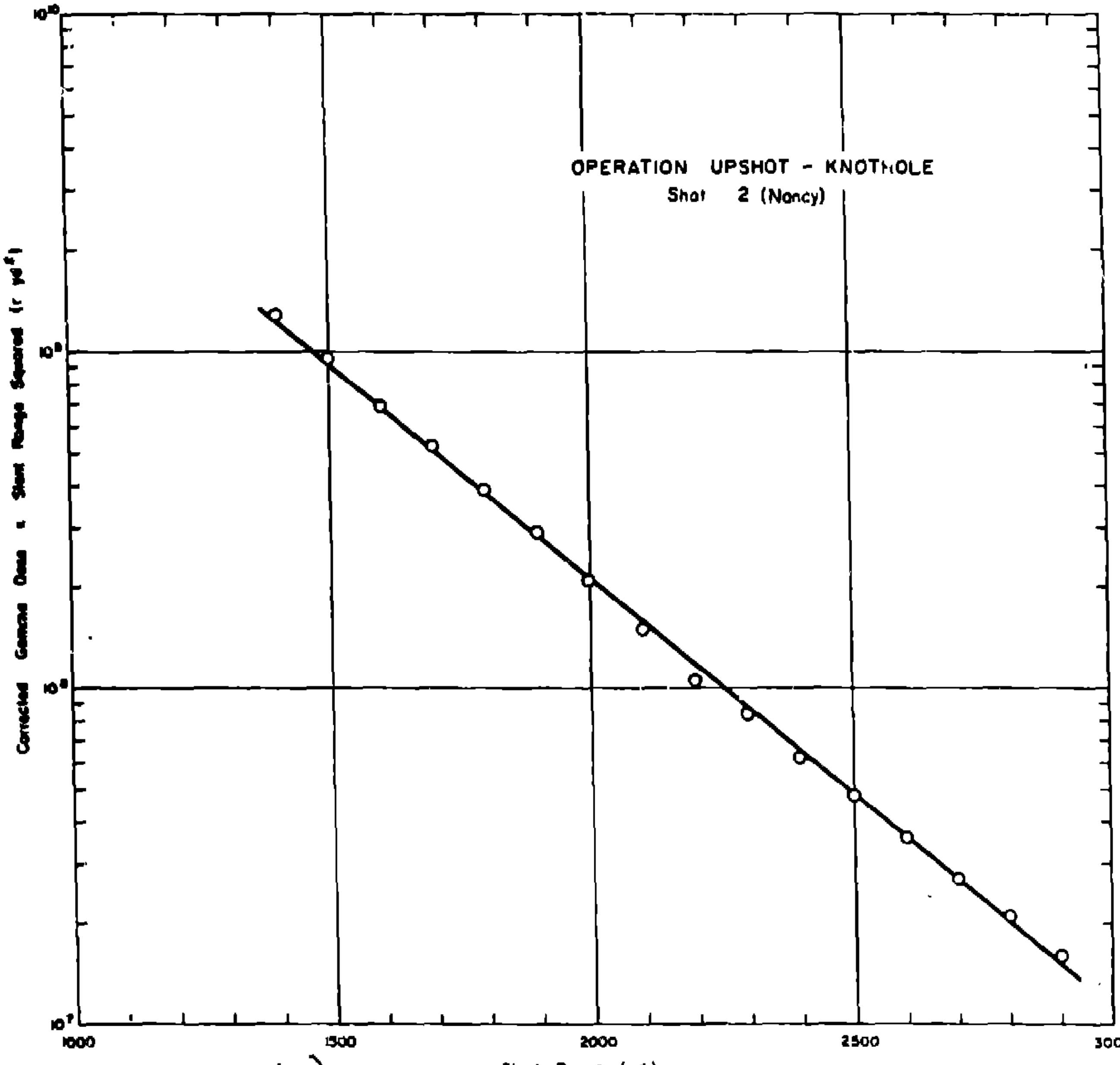


Figure 3.31 (~~S-RD~~) (U) Operation Upshot-Knothole - Shot 2 (Nancy) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.[illegible] SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT [illegible] ([illegible])

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: S	Total Fast Flux	Shield Type
yd			r	n/cm²	n/cm²	n/cm²	
412	a	1290	530	2.33x10[illegible]	b	b	c
510	a	1290	272	7.26x10[illegible]	b	b	c
608	a	1290	148	3.59x10[illegible]	b	b	c
708	a	606	80	1.91x10[illegible]	b	b	c
807	a	606	46	8.14x10[illegible]	b	b	c
906	a	606	26	5.02x10[illegible]	b	b	c
1,000	a	510	15	3.08x10[illegible]	b	b	c
1,100	a	510	10	1.69x10[illegible]	b	b	c
1,200	a	510	6.7	9.27x10[illegible]	b	b	c
1,300	a	510	4.4	4.97x10[illegible]	b	b	c
1,400	a	508	2.9	2.86x10[illegible]	b	b	c
1,500	a	508	1.9	1.54x10[illegible]	b	b	c
1,600	a	508	1.3	8.36x10[illegible]	b	b	c
1,700	a	508	0.95	4.62x10[illegible]	b	b	c
1,900	a	508	0.39	1.41x10[illegible]	b	b	c
2,000	a	508	0.28	7.70x10[illegible]	b	b	c
2,100	a	508	0.21	4.18x10[illegible]	b	b	c
2,200	a	508	0.15	2.31x10[illegible]	b	b	c

[a] Unknown.
[b] No data.
[c] NBS film holders attached to angle-iron stake.

(U) TABLE 3.[illegible] SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 5 (RAY)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
203	a	548-0	[illegible]	5.03x10[illegible]	57.2	180	b	7.20	244.4	6000	1.0	6000	58
253	a	548-0	3200	1.50x10[illegible]	17.1	59	b	2.14	79.24	3120	1.0	3120	[illegible]
[illegible]	a	548-0	1650	7.83x10[illegible]	8.97	41	b	1.13	51.10	1600	1.0	1600	[illegible]
[illegible]	a	1290	1000	3.20x10[illegible]	6.53	4.6	b	0.45	11.58	988	1.0	988	[illegible]
401	a	1290	750	1.77x10[illegible]	3.61	3.0	b	0.25	6.84	743	1.0	743	[illegible]
[illegible]	a	1290	276	[illegible]	1.07	1.3	b	[illegible]	[illegible]	274	1.0	274	2.0
[illegible]	a	606	[illegible]	[illegible]	0.41	0.27	b	[illegible]	[illegible]	125	1.0	125	0.5
713	a	606	71	1.07x10[illegible]	<0.41	<0.27	b	[illegible]	<0.701	71	1.0	71	[illegible]
[illegible]	a	606	44	[illegible]	<0.41	<0.27	b	[illegible]	<0.701	44	1.0	44	<0.5
[illegible]	a	[illegible]	[illegible]	[illegible]	<0.41	[illegible]	b	[illegible]	<0.701	[illegible]	1.0	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	a	510	10.2	[illegible]	<0.41	[illegible]	b	[illegible]	<0.701	10.2	1.0	10.2	[illegible]
1,177	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	<0.701	[illegible]	1.0	[illegible]	[illegible]

[a] Unknown.
[b] NBS film holders attached to aluminum [illegible].

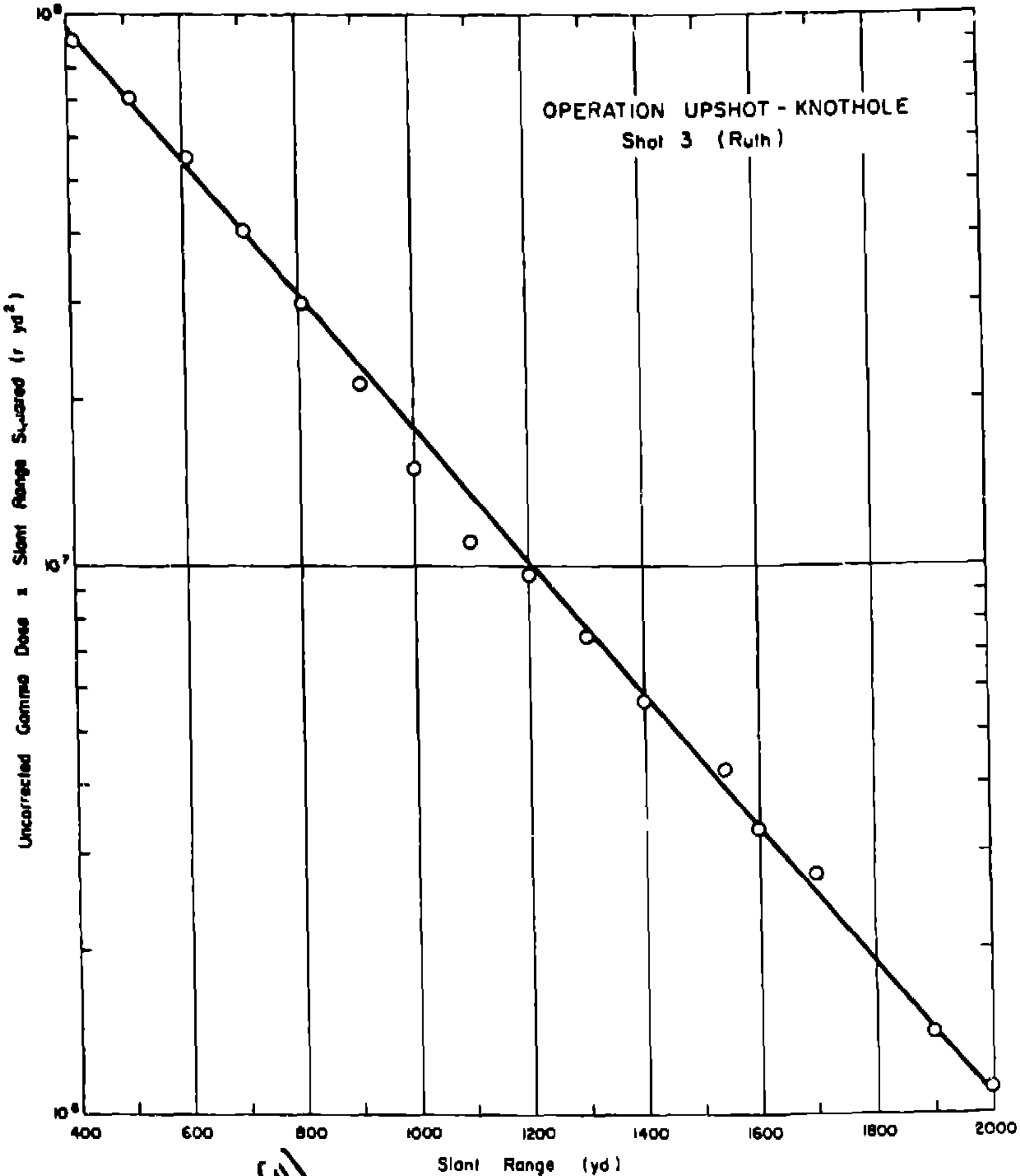


Figure 3.32 ~~(S-RD)~~ (U) Operation Upshot-Knothole - Shot 3 (Ruth) - Uncorrected gamma-dose-times slant-range-squared versus slant-range (U).

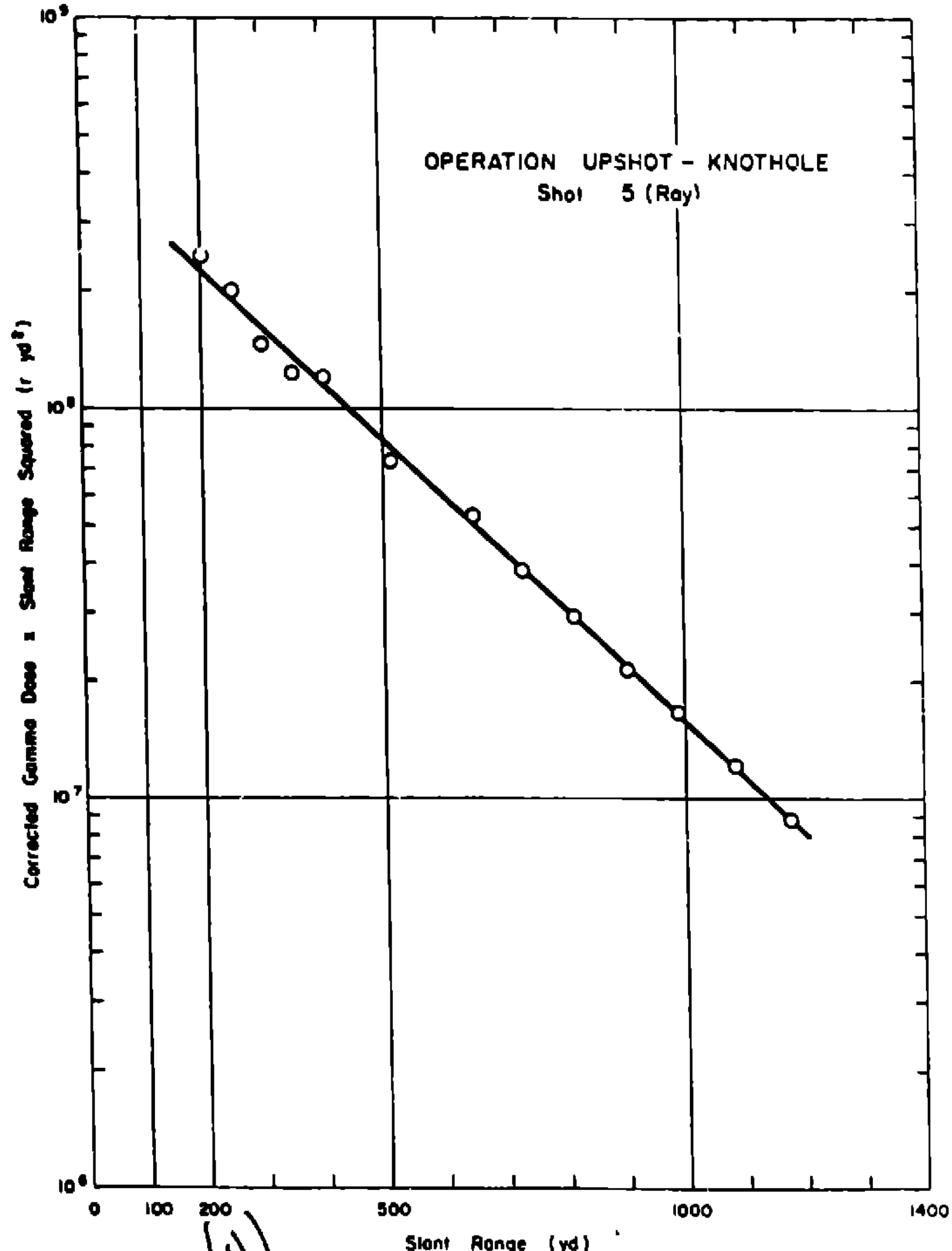


Figure 3.33 (S-RD) (U) Operation Upshot-Knothole - Shot 5 (Ray) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

(S-RD) TABLE 3.53 SCEL INITIAL GAMMA [illegible] UPSHOT-KNOTHOLE, SHOT 4 (BADGER)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
906	a	548-0	8720	1.21x10[11]	14.9	240	b	1.87	236.77	8480	1.0	8480	55
1,000	a	548-0	4840	7.23x10[10]	8.24	76	b	1.03	85.25	4800	1.0	4800	21
1,100	a	548-0	2470	3.75x10[10]	4.26	48	b	0.54	52.80	2420	1.0	2420	13
1,200	a	548-0	1600	1.83x10[10]	2.08	24	b	0.26	26.34	1570	1.0	1570	6.2
1,300	a	1290	1000	1.05x10[10]	2.14	2.4	b	0.15	4.69	995	1.0	995	3.9
1,400	a	1290	700	5.10x10[9]	1.04	1.2	b	0.073	2.313	698	1.0	698	2.3
1,500	a	1290	528	3.18x10[9]	0.65	0.72	b	0.045	1.415	527	1.0	527	1.0
1,600	a	1290	356	1.51x10[9]	0.31	0.49	b	0.021	0.821	355	1.0	355	<1.0
1,700	a	1290	228	9.98x10[8]	0.20	0.23	b	0.014	0.444	228	1.0	228	<1.0
1,800	a	1290	160	5.05x10[8]	<0.20	<0.23	b	<0.014	<0.444	160	1.0	160	<1.0
1,900	a	1290	115	3.70x10[8]	<0.20	<0.23	b	<0.014	<0.444	115	1.0	115	<1.0
2,000	a	606	76	1.65x10[8]	<0.20	<0.23	b	<0.014	<0.444	76	1.0	76	<1.0
2,100	a	606	53	9.[illegible]x10[7]	<0.20	<0.23	b	<0.014	<0.444	53	1.0	53	<1.0
2,200	a	606	36	5.[illegible]x10[7]	<0.20	<0.23	b	<0.014	<0.444	36	1.0	36	<1.0
2,300	a	606	29	2.75x10[7]	<0.20	<0.23	b	<0.014	<0.444	29	1.0	29	<1.0
2,400	a	606	19	1.50x10[7]	<0.20	<0.23	b	<0.014	<0.444	19	1.0	19	<1.0
2,500	a	510	13.3	<1x10[7]	<0.20	<0.23	b	<0.014	<0.444	13.3	1.0	13.3	<1.0
2,600	a	510	9.3	<1x10[7]	<0.20	<0.23	b	<0.014	<0.444	9.3	1.0	9.3	<1.0
2,700	a	510	6.6	<1x10[7]	<0.20	<0.23	b	<0.014	<0.444	6.6	1.0	6.6	<1.0
2,800	a	508	4.75	<1x10[7]	<0.20	<0.23	b	<0.014	<0.444	4.75	1.0	4.75	<1.0
2,900	a	508	3.7	<1x10[7]	<0.20	<0.23	b	<0.014	<0.444	3.7	1.0	3.7	<1.0

[a] Unknown.
[b] No data.
[c] NBS film holders attached to angle-iron stake.

(U)

(S-RD) TABLE 3.54 SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 7 (SIMON)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
yd			r	n/cm²	n/cm²	
1,166	a	548-0	6100	b	b	c
1,366	a	548-0	1150	b	b	c
1,466	a	1290	716	b	b	c
1,766	a	1290	540	b	b	c
[illegible]	a	[illegible]	[illegible]	b	b	c
[illegible]	a	[illegible]	225	b	b	c
2,066		1290	[illegible]	b	b	c
2,166	a	[illegible]	84	b	b	c
[illegible]	a	[illegible]	[illegible]	b	b	c
[illegible]	a	[illegible]	[illegible]	b	b	c
[illegible]	a	[illegible]	[illegible]	b	b	c
[illegible]	a	510	17	b	b	c
[illegible]	a	510	[illegible]	b	b	c
[illegible]		[illegible]	[illegible]	b	b	c
[illegible]		[illegible]	[illegible]	b	b	c
[illegible]		[illegible]	[illegible]	b	b	c
[illegible]						

[a] Approximately [illegible]
[b] No data.
[c] [illegible] film holders attached to angle-iron stake.

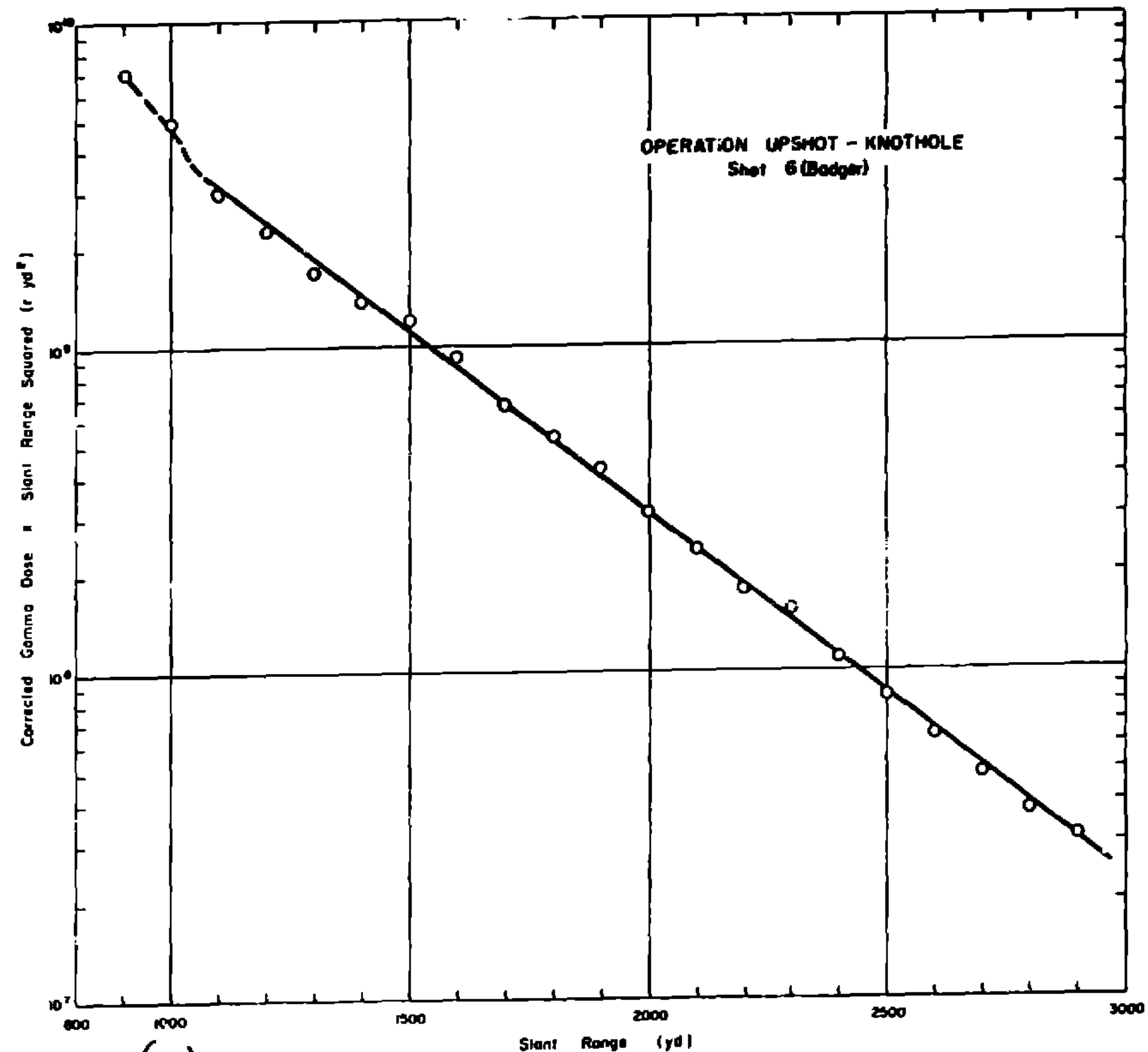


Figure 3.34 (S-RD) (U) Operation Upshot-Knothole - Shot 6 (Badger) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

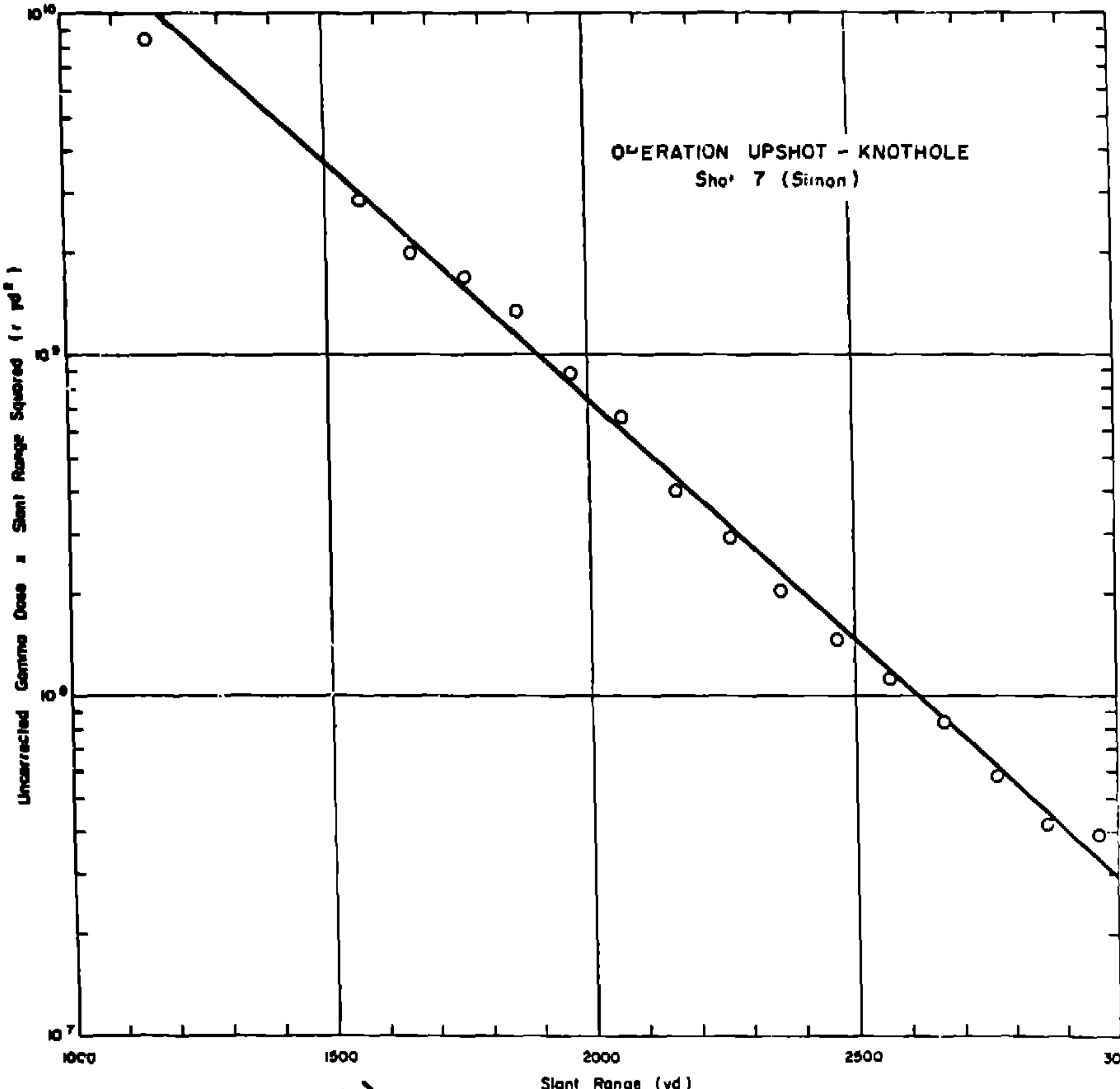
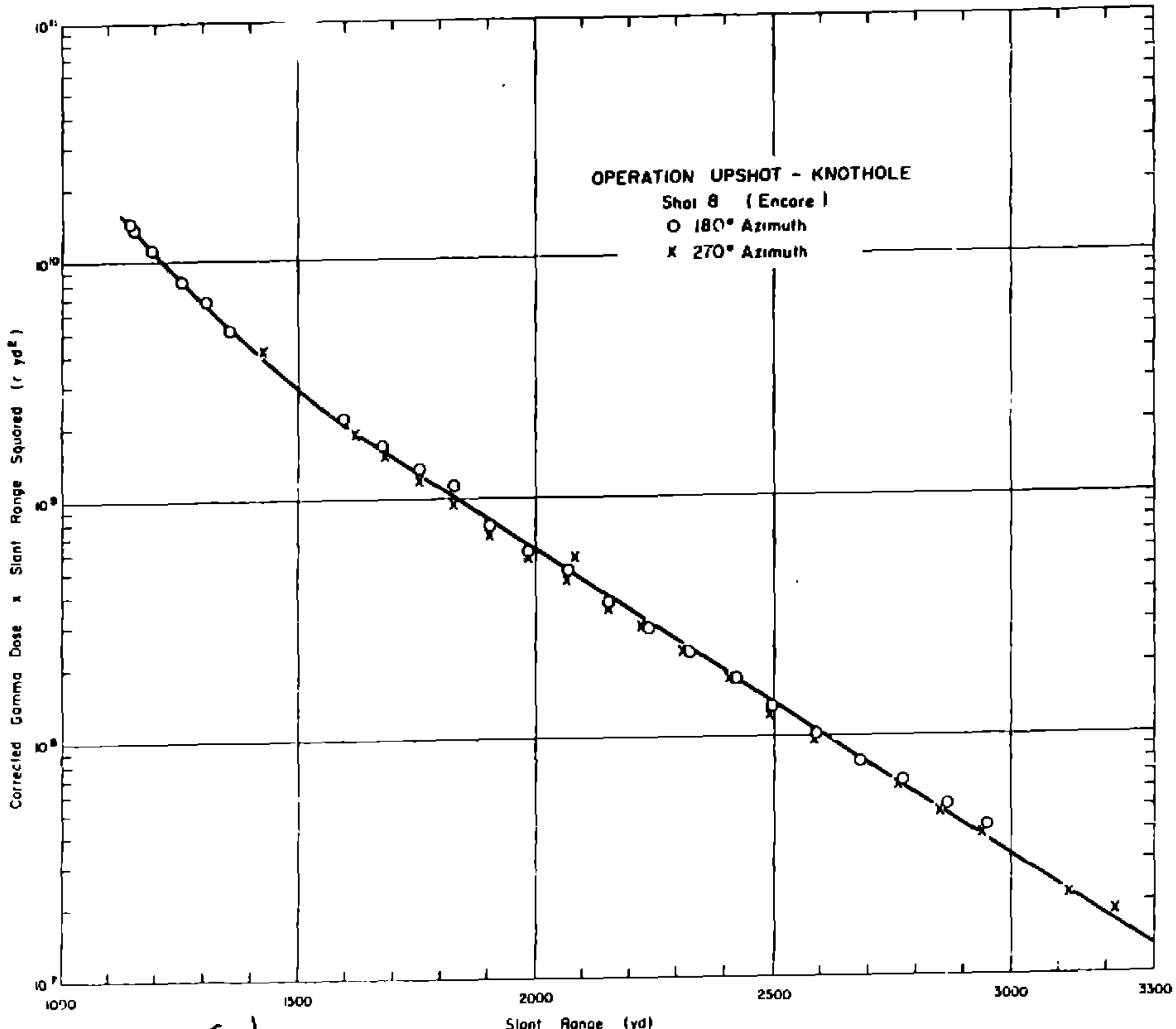


Figure 3.35 (~~S-RD~~)(U) Operation Upshot-Knothole - Shot 7 (Simon)-
Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.55 STEL INI GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 8 (ENCORE)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,140	a	548-0	11,050	5.4x10⁹	6.1	72	b	0.77	78.87	10,970	1.0	10,970	33
1,149	a	548-0	10,050	[illegible]	5.8	69	b	0.71	75.51	9,975	1.0	9,975	30
1,187	a	548-0	7,950	3.[illegible]x10⁹	4.4	55	b	0.51	59.91	7,890	1.0	7,890	23
1,253	a	548-0	5,240	2.7x10⁹	3.1	38	b	0.38	41.48	5,200	1.0	5,200	16
1,300	a	548-0	4,000	2.0x10⁹	2.3	30	b	0.31	32.61	3,970	1.0	3,970	13
1,353	a	548-0	2,800	1.5x10⁹	1.7	24	b	0.16	25.86	2,770	1.0	2,770	10
1,59[illegible]	a	1290	850	3.[illegible]x10⁸	0.66	1.0	b	0.061	1.721	848	1.0	848	6.2
1,670	a	1290	589	2.0x10⁸	0.41	0.63	b	0.029	1.069	587	1.0	587	2.5
1,746	a	1290	432	1.27x10⁸	0.26	0.42	b	<0.029	0.68	431	1.0	431	1.3
1,822	a	1290	334	8.0x10⁷	0.16	0.27	b	<0.029	0.43	334	1.0	334	0.74
1,900	a	1290	210	5.0x10⁷	0.10	0.19	b	<0.029	0.29	210	1.0	210	<0.74
1,972	a	1290	152	3.0x10⁷	<0.10	<0.19	b	<0.029	<0.29	152	1.0	152	<0.74
2,0[illegible]	a	606	116	1.[illegible]x10⁷	<0.10	<0.19	b	<0.029	<0.29	11[illegible]	1.0	116	<0.74
2,149	a	606	78	1.0x10⁷	<0.10	<0.19	b	<0.029	<0.29	78	1.0	78	<0.74
2,23[illegible]	a	606	57	6.[illegible]x10⁶	<0.10	<0.19	b	<0.029	<0.29	57	1.0	57	<0.74
2,322	a	606	42	3.7x10⁶	<0.10	<0.19	b	<0.029	<0.29	[illegible]	1.0	42	<0.74
2,4[illegible]	a	606	30	2.1x10⁶	<0.10	<0.19	b	<0.029	<0.29	30	1.0	30	<0.74
2,49[illegible]	a	510	21	1.27x10⁶	<0.10	<0.19	b	<0.029	<0.29	21	1.0	21	<0.74
2,585	a	510	15	6.8x10⁵	<0.10	<0.19	b	<0.029	<0.29	15	1.0	15	<0.74
2,651	a	510	11	3.[illegible]x10⁵	<0.10	<0.19	b	<0.029	<0.29	11	1.0	11	<0.74
2,771	b	510	8.5	2.[illegible]x10⁵	<0.10	<0.19	b	<0.029	<0.29	8.5	1.0	8.5	<0.74
2,865	b	510	6.3	1.[illegible]x10⁵	<0.10	<0.19	b	<0.029	<0.29	6.3	1.0	6.3	<0.74
2,953	b	510	4.75	7.3x10⁴	<0.10	<0.19	b	<0.029	<0.29	4.75	1.0	4.75	<0.74
1,418	c	548-0	2,100	9.8x10⁸	1.1	16	b	0.14	17.2	2,080	1.0	2,080	6.2
1,60[illegible]	c	1290	720	3.0x10⁸	0.61	0.89	b	<0.14	[illegible]	713	1.0	718	2.1
1,67[illegible]	c	1290	538	1.9x10⁸	0.39	0.63	b	<0.14	[illegible]	535	1.0	535	1.2
1,749	c	1290	395	1.[illegible]x10⁸	0.26	0.42	b	<0.14	0.68	387	1.0	387	0.74
1,825	c	1290	200	7.1x10⁷	0.16	0.27	b	<0.14	0.43	200	1.0	200	<0.74
1,900	c	1290	162	5.0x10⁷	0.10	0.19	b	<0.14	0.29	[illegible]	1.0	162	<0.74
1,982	c	1290	144	3.0x10⁷	<0.10	<0.19	b	<0.14	<0.29	144	1.0	144	<0.74
2,062	c	606	1[illegible]	1.6x10⁷	<0.10	<0.19	b	<0.14	<0.29	10[illegible]	1.0	106	<0.74
2,155	c	606	78	1.0x10⁷	<0.10	<0.19	b	<0.14	<0.29	78	1.0	78	<0.74
2,23[illegible]	c	606	59	6.[illegible]x10⁶	<0.10	<0.19	b	<0.14	<0.29	[illegible]	1.0	59	<0.74
2,315	c	606	42	3.0x10⁶	<0.10	<0.19	b	<0.14	<0.29	42	1.0	42	<0.74
2,40[illegible]	c	606	30	2.1x10⁶	<0.10	<0.19	b	<0.14	<0.29	30	1.0	30	<0.74
2,4[illegible]	c	510	20	1.[illegible]x10⁶	<0.10	<0.19	b	<0.14	<0.29	20	1.0	20	<0.74
2,57[illegible]	c	510	14.8	7.[illegible]x10⁵	<0.10	<0.19	b	<0.14	<0.29	14.8	1.0	14.8	<0.74
2,7[illegible]	c	510	9.1	2.[illegible]x10⁵	<0.10	<0.19	b	<0.14	<0.29	9.1	1.0	9.1	<0.74
2,[illegible]	c	510	6	1.[illegible]x10⁵	<0.10	<0.19	b	<0.14	<0.29	6	1.0	6	<0.74
2,[illegible]	c	510	4.4	7.[illegible]x10⁴	<0.10	<0.19	b	<0.14	<0.29	4.4	1.0	4.4	<0.74
3,1[illegible]	c	510	2.17	4.[illegible]x10⁴	<0.10	<0.19	b	<0.14	<0.29	2.17	1.0	2.17	<0.74
3,223	c	510	1.75	1.3x10⁴	<0.10	<0.19	b	<0.14	<0.29	1.75	1.0	1.75	<0.74

[a] Approximately 1 [illegible]°.
[b] [illegible] film holders attached to aluminum stake.
[c] Approximately [illegible]0°.



(U)

Figure 3.36 (S-RD) Operation Upshot-Knothole - Shot 8 (Encore) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.50 SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 9 (HARRY)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
906	a	548-0	10,000	1.5×10^{11}	17	150	b	2.1	169.1	9830	1.0	9830	43
1,005	a	548-0	5,600	8.0×10^{10}	9.1	79	b	1.2	89.3	5510	1.0	5510	23
1,105	a	548-0	3,350	4.2×10^{10}	4.8	45	b	0.60	50.4	3300	1.0	3300	13
1,200	a	548-0	2,100	2.2×10^{10}	2.5	25	b	0.40	27.9	2070	1.0	2070	6.8
1,300	a	1290	1,400	1.1×10^{10}	2.3	2.2	b	0.10	4.60	1400	1.0	1400	3.5
1,500	a	1290	620	3.3×10^{9}	0.67	0.66	b	<0.10	1.33	619	1.0	619	1.0
1,600	a	1290	392	1.7×10^{9}	0.35	0.38	b	<0.10	0.73	391	1.0	391	0.50
1,700	a	1290	270	8.8×10^{8}	0.18	0.19	b	<0.10	0.37	270	1.0	270	<0.50
1,800	a	1290	176	4.4×10^{8}	0.10	0.11	b	<0.10	0.21	176	1.0	176	<0.50
1,900	a	606	128	2.4×10^{8}	<0.10	<0.11	b	<0.10	<0.21	128	1.0	128	<0.50
2,000	a	606	90	1.3×10^{8}	<0.10	<0.11	b	<0.10	<0.21	90	1.0	90	<0.50
2,100	a	606	60	6.7×10^{7}	<0.10	<0.11	b	<0.10	<0.21	60	1.0	60	<0.50
2,200	a	606	43	3.5×10^{7}	<0.10	<0.11	b	<0.10	<0.21	43	1.0	43	<0.50
2,300	a	[illegible]	33	1.8×10^{7}	<0.10	<0.11	b	<0.10	<0.21	33	1.0	33	<0.50
2,400	a	510	22	9.4×10^{6}	<0.10	<0.11	b	<0.10	<0.21	22	1.0	22	<0.50
2,500	a	510	16.6	5.0×10^{6}	<0.10	<0.11	b	<0.10	<0.21	16.6	1.0	16.6	<0.50

[a] Unknown.
[b] 1290 film holders attached aluminum stake.

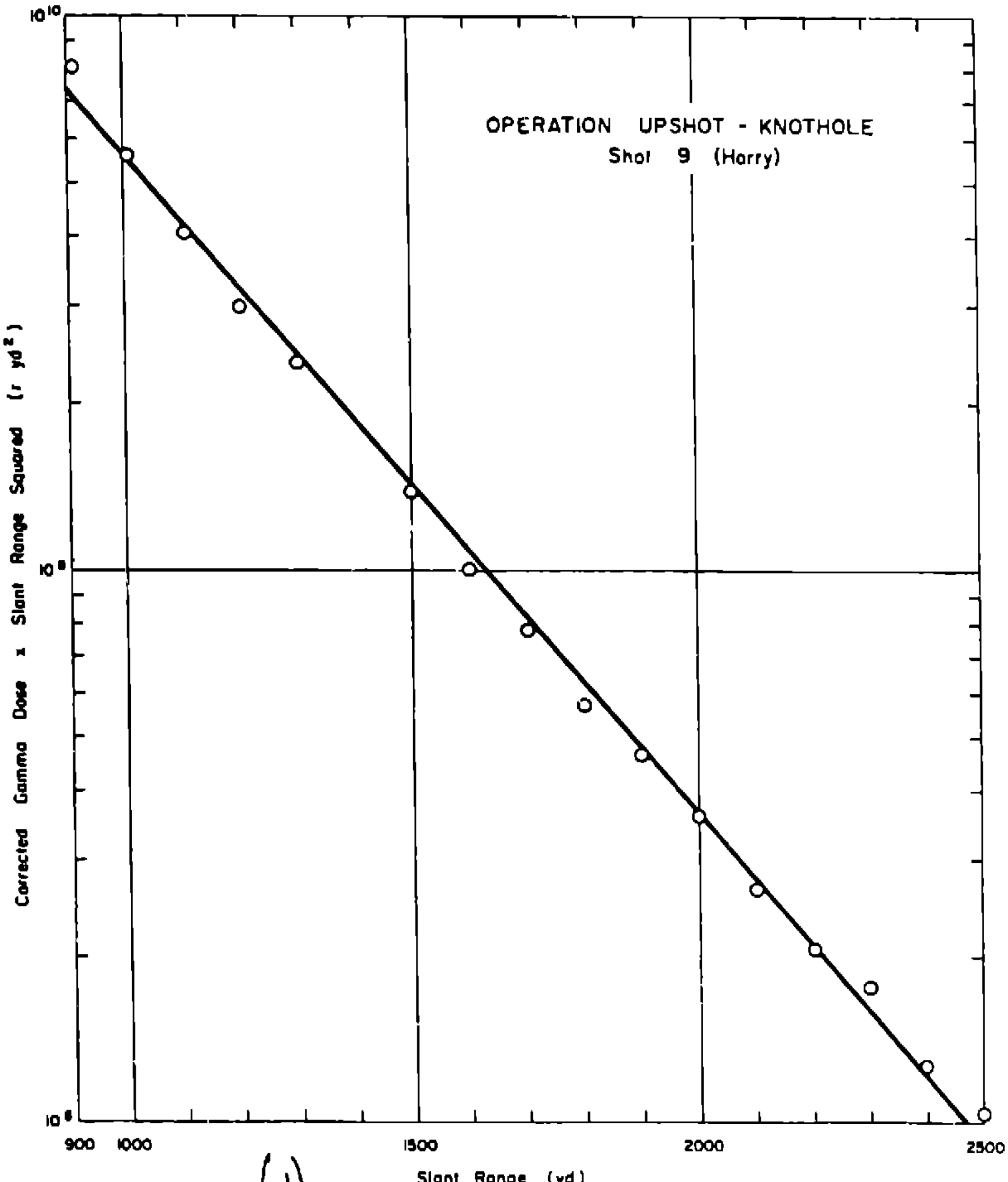


Figure 3.37 (S-RD) (U) Operation Upshot-Knothole - Shot 9 (Harry) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

TABLE 3.[illegible] SCEL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 10 (GRABLE)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm^2	r	r		r	r	r		r	r
889	a	548-0	7300	1.80×10^{12}	205	1040	b	25.8	1270.8	6030	1.0	6030	416
987	a	548-0	4100	9.20×10^{11}	105	590	b	13.3	708.2	3390	1.0	3390	220
1,277	a	1290	820	[illegible]	27.0	17	b	1.88	45.88	774	1.0	774	35
1,375	a	1290	500	7.00×10^{10}	14.3	10	b	1.00	25.3	475	1.0	475	20
1,475	a	1290	340	3.60×10^{10}	7.35	5.5	b	0.51	13.36	327	1.0	327	10
1,575	a	1290	228	1.90×10^{10}	3.88	3.1	b	0.27	7.25	221	1.0	221	5.6
1,671	a	1290	144	9.80×10^{9}	2.00	1.8	b	0.14	3.94	140	1.0	140	3.1
1,771	a	606	93	5.10×10^{9}	1.16	0.64	b	0.073	1.87	91	1.0	91	1.8
1,869	a	606	67	2.70×10^{9}	0.61	0.36	b	0.039	1.01	66	1.0	66	0.90
1,965	a	606	45	1.40×10^{9}	0.32	0.21	b	<0.039	0.53	44	1.0	44	<0.90
2,067	a	606	32	7.30×10^{8}	0.116	0.12	b	<0.039	0.28	32	1.0	32	<0.90
2,167	a	510	21	3.75×10^{8}	0.080	0.095	b	<0.039	0.175	21	1.0	21	<0.90
2,266	a	510	14.3	1.94×10^{8}	0.040	0.055	b	<0.039	0.095	14.2	1.0	14.2	<0.90
2,366	a	510	10.1	1.00×10^{8}	0.021	0.030	b	<0.039	0.051	10.0	1.0	10.0	<0.90
2,465	a	510	7.3	5.30×10^{7}	<0.021	<0.030	b	<0.039	<0.051	7.3	1.0	7.3	<0.90
2,565	a	508	4.6	2.72×10^{7}	<0.021	<0.030	b	<0.039	<0.051	4.6	1.0	4.6	<0.90
2,664	a	508	3.2	1.45×10^{7}	<0.021	<0.030	b	<0.039	<0.051	3.2	1.0	3.2	<0.90
2,764	a	508	2.4	7.55×10^{6}	<0.021	<0.030	b	<0.039	<0.051	2.4	1.0	2.4	<0.90
2,864	a	508	1.7	3.90×10^{6}	<0.021	<0.030	b	<0.039	<0.051	1.7	1.0	1.7	<0.90
908	c	548-0	6500	1.60×10^{12}	182	920	b	22.9	1124.9	5380	1.0	5380	360
1,003	c	548-0	3900	8.20×10^{11}	93.2	530	b	11.7	634.9	3270	1.0	3270	[illegible]
1,242	c	1290	820	1.20×10^{11}	24.5	16	b	1.71	42.21	778	1.0	778	31
1,392	c	1290	464	6.20×10^{10}	12.7	8.0	b	0.89	21.59	442	1.0	442	17
1,440	c	1290	320	3.20×10^{10}	6.69	4.0	b	0.47	11.16	309	1.0	309	9.4
1,540	c	1290	200	1.70×10^{10}	3.47	2.8	b	0.24	6.51	193	1.0	193	5.2
1,630	c	1290	134	8.60×10^{9}	1.80	1.6	b	0.13	3.53	130	1.0	130	3.0
[illegible]	c	606	89	4.40×10^{9}	1.05	0.80	b	0.066	1.92	87	1.0	87	1.4
[illegible]	c	606	60	2.40×10^{9}	0.55	0.40	b	<0.036	0.984	59	1.0	59	[illegible]
[illegible]	c	606	40	1.23×10^{9}	0.28	0.20	b	<0.036	0.41	39	1.0	39	[illegible]
2,0[illegible]5	c	606	30	6.40×10^{8}	0.15	0.15	b	<0.036	0.30	30	1.0	30	<0.91
2,184	c	606	15	3.40×10^{8}	0.077	0.08	b	<0.036	0.157	15	1.0	15	[illegible]
[illegible]	c	510	11	1.70×10^{8}	0.037	0.04	b	<0.036	0.061	11	1.0	11	[illegible]
[illegible]	c	510	[illegible]	9.20×10^{7}	<0.037	<0.04	b	<0.036	<0.041	[illegible]	1.0	[illegible]	[illegible]
[illegible]	c	510	7.2	[illegible]	<0.037	<0.04	b	<0.036	<0.041	7.2	1.0	7.2	[illegible]
[illegible]	c	510	4.9	[illegible]	<0.037	<0.04	b	<0.036	<0.041	4.9	1.0	[illegible]	[illegible]
[illegible]	c	508	[illegible]	[illegible]	<0.037	<0.04	b	<0.036	<0.041	3.3	1.0	3.3	[illegible]
[illegible]	c	508	2.5	[illegible]	<0.037	<0.04	b	<0.036	<0.041	2.5	1.0	2.5	[illegible]
[illegible]	c	508	1.8	[illegible]	<0.037	<0.04	b	<0.036	<0.041	1.8	1.0	1.8	<0.91

[a] Approximately [illegible].
[b] NBS film holder attached to aluminum stake
[c] Approximately [illegible].

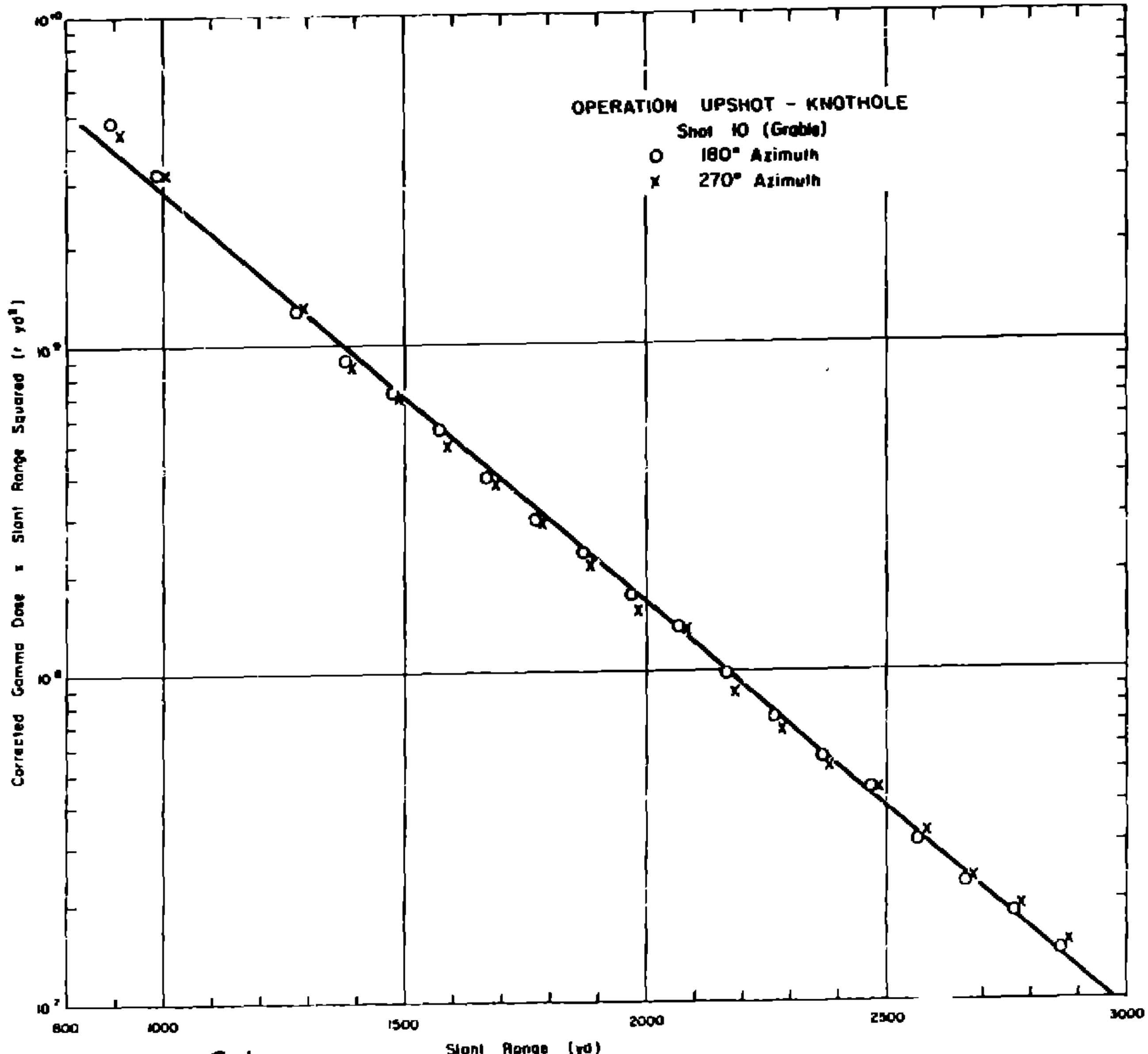


Figure ~~3.38~~ (U) ~~(S-RD)~~ Operation Upshot-Knothole - Shot 10 (Grable) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) ~~(S-LL)~~ TABLE 3.58 LASL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 5

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm²	
300	a	1290	2180	7.89x10¹⁰	b
400	a	1290	750	1.77x10¹⁰	b
500	a	1290	355	6.11x10⁹	b
600	a	1290	190	2.52x10⁹	b
700	a	606	105	1.24x10⁹	b
800	a	606	54	6.48x10⁸	b
900	a	606	32	3.31x10⁸	b
1,000	a	510	19	1.70x10⁸	b
1,100	a	510	11	8.61x10⁷	b
1,200	a	502	7.2	4.41x10⁷	b
1,300	a	502	4.7	2.25x10⁷	b
1,400	a	502	2.7	1.16x10⁷	b
1,500	a	502	1.7	5.88x10⁶	b
1,600	a	502	1.0	2.98x10⁶	b
1,700	a	502	0.70	1.53x10⁶	b
1,800	a	502	0.57	7.88x10⁵	b
1,900	a	502	0.35	4.1x10⁵	b
2,000	a	502	0.22	2.10x10⁵	b

[a] Unknown
[b] AW film holder attached to angle-iron stake.

(U) TABLE 3.59 LASL INITIAL GAMMA DOSE DATA - UNCORRECTED NEUTRON-ANGLE, SHOT 6

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Shield Type
yd			r	n/cm²	
1,400	a	1290	710	5.29x10[illegible]	b
1,500	a	1290	487	2.94x10[illegible]	b
1,600	a	1290	296	1.65x10[illegible]	b
1,700	a	1290	209	9.09x10[illegible]	b
1,800	a	1290	146	5.01x10[illegible]	b
1,900	a	606	93	2.76x10[illegible]	b
2,000	a	606	Lost	1.54x10[illegible]	b
2,100	a	606	49	8.51x10[illegible]	b
2,200	a	606	35	4.67x10[illegible]	b
2,300	a	606	25	2.53x10[illegible]	b
2,400	a	510	19	1.40x10[illegible]	b
2,500	a	510	14	7.71x10[illegible]	b
2,600	a	510	9.6	4.26x10[illegible]	b
2,700	a	502	7.0	2.35x10[illegible]	b
2,800	a	502	5.2	1.29x10[illegible]	b
2,900	a	502	3.7	7.13x10[illegible]	b
3,000	a	502	2.8	3.91x10[illegible]	b
3,100	a	502	2.0	2.16x10[illegible]	b
3,200	a	502	1.6	1.20x10[illegible]	b
3,300	a	502	1.0	6.56x10[illegible]	b
3,400	a	502	0.8	3.57x10[illegible]	b
1,500	c	1290	452	2.94x10[illegible]	b
1,600	c	1290	313	1.65x10[illegible]	b
1,700	c	1290	218	9.09x10[illegible]	b
1,800	c	1290	157	5.01x10[illegible]	b
1,900	c	606	96	2.70x10[illegible]	b
2,000	c	606	67	1.54x10[illegible]	b
2,100	c	606	49	8.51x10[illegible]	b
2,200	c	606	35	4.67x10[illegible]	b
2,300	c	606	26	2.53x10[illegible]	b
2,400	c	510	18	1.40x10[illegible]	b
2,500	c	510	13	7.71x10[illegible]	b
2,600	c	510	9.0	4.26x10[illegible]	b
2,700	c	502	7.1	2.35x10[illegible]	b
2,800	c	502	4.5	1.29x10[illegible]	b
2,900	c	502	3.7	7.13x10[illegible]	b
3,000	c	502	2.7	3.91x10[illegible]	b
3,100	c	502	1.9	2.16x10[illegible]	b
3,200	c	502	[illegible]	1.20x10[illegible]	b
3,300	c	502	0.96	6.56x10[illegible]	b

[a] Approximately [illegible]°.
[b] [illegible] fastened to [illegible] stake.
[c] Approximately 40°.

(U) TABLE 3.13 LASL INITIAL GAMMA DOSE DATA - OPERATION SNAPPER-KNOTHOLE, SHOT 10

Slant Range	Azimuth	Film Type	Unconnected Gamma Dose	Neutron Flux ϕ_{th}	Shield Type
yd			r	n/cm²	
1,240	a	1290	550	1.60×10^{11}	b
1,340	a	1230	400	8.30×10^{10}	b
1,440	a	1220	315	4.25×10^{10}	b
1,540	a	1250	210	2.20×10^{10}	b
1,?40	a	1200	150	1.13×10^{10}	b
1,?40	a	606	96	[illegible]	b
1,840	a	606	70	3.00×10^{9}	b
1,940	a	[illegible]	46	1.60×10^{9}	b
2,010	a	606	31	8.80×10^{8}	b
2,110	a	606	23.9	4.50×10^{8}	b
2,210	a	510	16.8	2.35×10^{8}	b
2,310	a	510	11.0	1.22×10^{8}	b
2,430	a	510	8.6	6.40×10^{7}	b
2,530	a	502	6.2	3.30×10^{7}	b
2,630	a	502	4.4	1.70×10^{7}	b
2,730	a	502	3.1	9.00×10^{6}	b
2,830	a	502	2.4	4.65×10^{6}	b
2,930	a	502	1.8	2.40×10^{6}	b
3,030	a	502	1.4	1.23×10^{6}	b
3,130	a	502	1.0	6.30×10^{5}	b
3,230	a	502	0.80	3.30×10^{5}	b
1,170	c	1290	1220	2.50×10^{11}	b
1,260	c	1290	775	1.40×10^{11}	b
1,300	c	1240	470	7.20×10^{10}	b
1,400	c	1240	310	3.70×10^{10}	b
1,500	c	1240	200	1.90×10^{10}	b
1,600	c	1200	140	1.00×10^{10}	b
1,700	c	606	96	5.20×10^{9}	b
1,800	c	606	65	2.70×10^{9}	b
1,900	c	606	44	1.40×10^{9}	b
2,000	c	606	30	7.30×10^{8}	b
2,100	c	606	23.0	3.75×10^{8}	b
2,200	c	510	16.4	1.95×10^{8}	b
2,300	c	510	12.0	1.00×10^{8}	b
2,400	c	510	7.5	5.25×10^{7}	b
2,500	c	502	5.6	2.73×10^{7}	b
2,600	c	502	4.1	1.43×10^{7}	

[a] 2.5° W of North line.
[b] All film [illegible] enclosed in angle-iron stake.
[c] 2.5° W of South line.

(U) TABLE 3.61 LASL INITIAL GAMMA DOSE DATA - OPERATION UPSHOT-KNOTHOLE, SHOT 11

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: S	Neutron Flux: Total Fast Flux	Shield Type
yd			r	n/cm²	n/cm²	n/cm²	
1,600	a	1290	895	b	b	b	c
1,700	a	1290	610	b	b	b	c
1,800	a	1290	450	b	b	b	c
1,900	a	1290	320	b	b	b	c
2,000	a	1290	245	b	b	b	c
2,090	a	1290, 606	175	b	b	b	c
2,180	a	1290, 606	130	b	b	b	c
2,280	a	1290, 606	96	b	b	b	c
2,380	a	1290, 606	71	b	b	b	c
2,480	a	1290, 606	52	b	b	b	c
2,580	a	1290, 606	40	b	b	b	c
2,670	a	1290, 606	29	b	b	b	c
2,770	a	1290, 606	22	b	b	b	c
2,870	a	510	17	b	b	b	c
2,970	a	510	12	b	b	b	c
3,070	a	510	9.1	b	b	b	c
3,170	a	510, 502	6.8	b	b	b	c
3,270	a	510, 502	5.0	b	b	b	c
3,370	a	510, 502	3.8	b	b	b	c
3,470	a	510, 502	2.9	b	b	b	c
3,570	a	510, 502	2.1	b	b	b	c
3,660	a	502	1.7	b	b	b	c
3,760	a	502	1.2	b	b	b	c
3,[illegible]	a	502	0.96	b	b	b	c
3,[illegible]	a	[illegible]	0.8	b	b	b	c

[a] Unknown

[b] No neutron [illegible] available.

[c] AW film holder attached to angle-iron stake.

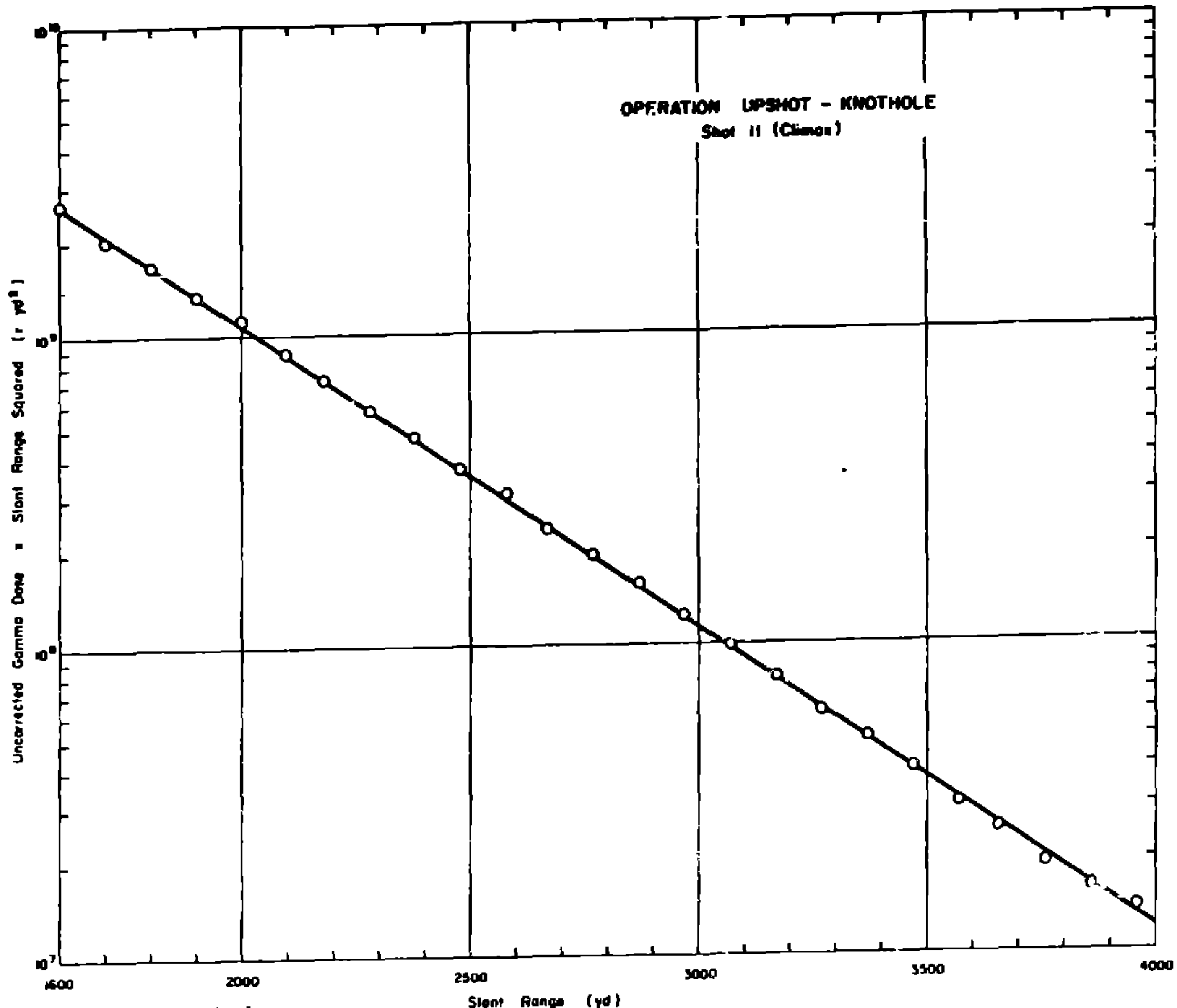


Figure 3.39 ~~(S-RD)~~ (U) Operation Upshot-Knothole - Shot 11 (Climax) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(~~S-RD~~) (U) TABLE 3.62 SHOT INFORMATION - OPERATION CASTLE

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Total	HE Thickness
			ft	kt	cm
3 (Koon)	6 April 1954 1820:00 GMT	Bikini Tare-Surface Coral	13.6	150	a
4 (Union)	25 April 1954 1810:01 GMT	Bikini-Near Dog and Fox - Surface Barge	7	7.0×10^3	a
6 (Nectar)	13 May 1954 1820:00 GMT	Eniwetok-Ivy Mike Crater-Surface Barge	7	1.7×10^3	a

[a] Not reported.

(U) TABLE 3.63 METEOROLOGICAL DATA - OPERATION CASTLE

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^2$
	mb	°K	$g/cm^3 \times 10^3$		
Koon	1009.7	300.2	1.18	0.91	1.21
Union	1007.4	300.2	1.17	0.90	1.23
Nectar	1006.4	299.7	1.17	0.90	1.23

(U) TABLE 3.14 INITIAL GAMMA DOSE DATA - OPERATION CASTLE

Station Number	Location	Distance from GZ	Recovery Time	Detector Type	Total Exposure	Residual Radiation Rate at Time of Recovery	Calculated Residual Exposure	Estimated Initial Gamma Dose
		yd	hr		r	r/hr	r	r
Shot 3 (Koon)								
210.31	Roger Reef	2500	52	Film	22.2	0.003	1.2	21
210.30	Roger Reef	2500	52	Film	22.4	0.006	2.7	20
210.69	Roger Reef	2670	52	Film	14.2	0.006	2.3	12
210.68	Roger Reef	2830	52	Film	8.4	0.006	2.1	6.1
210.15	Easy	3200	104	Chem Dos	23,300	2.60	1200	22,100
Shot 6 (Nectar)								
210.78	Lima	1,940	80	Chem Dos	400,000	4.20	3000	400,000
210.77	Daisy	2100	80	Chem Dos	34,800	0.250	150	34,650
210.76	Clara	~~2200~~ 2870	80	(Assume) Film	1,800	0.210	125	1,700
210.79	Irene	3000	80	Film	640	0.055	40	600

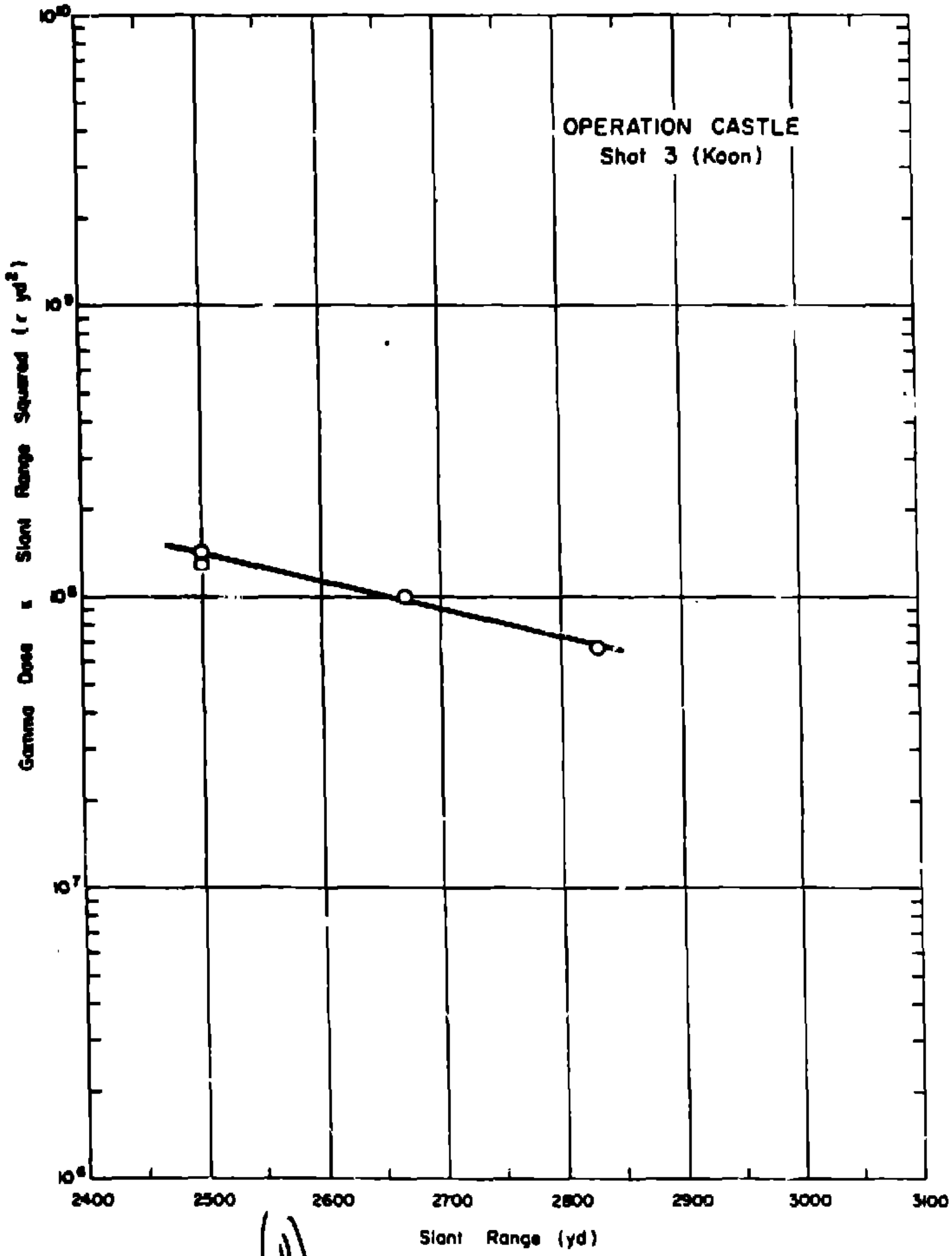


Figure 3.40 ~~(S-RD)~~ (U) Operation Castle - Shot 3 (Koon) - Gamma-dose-times-slant-range-squared versus slant-range (U).

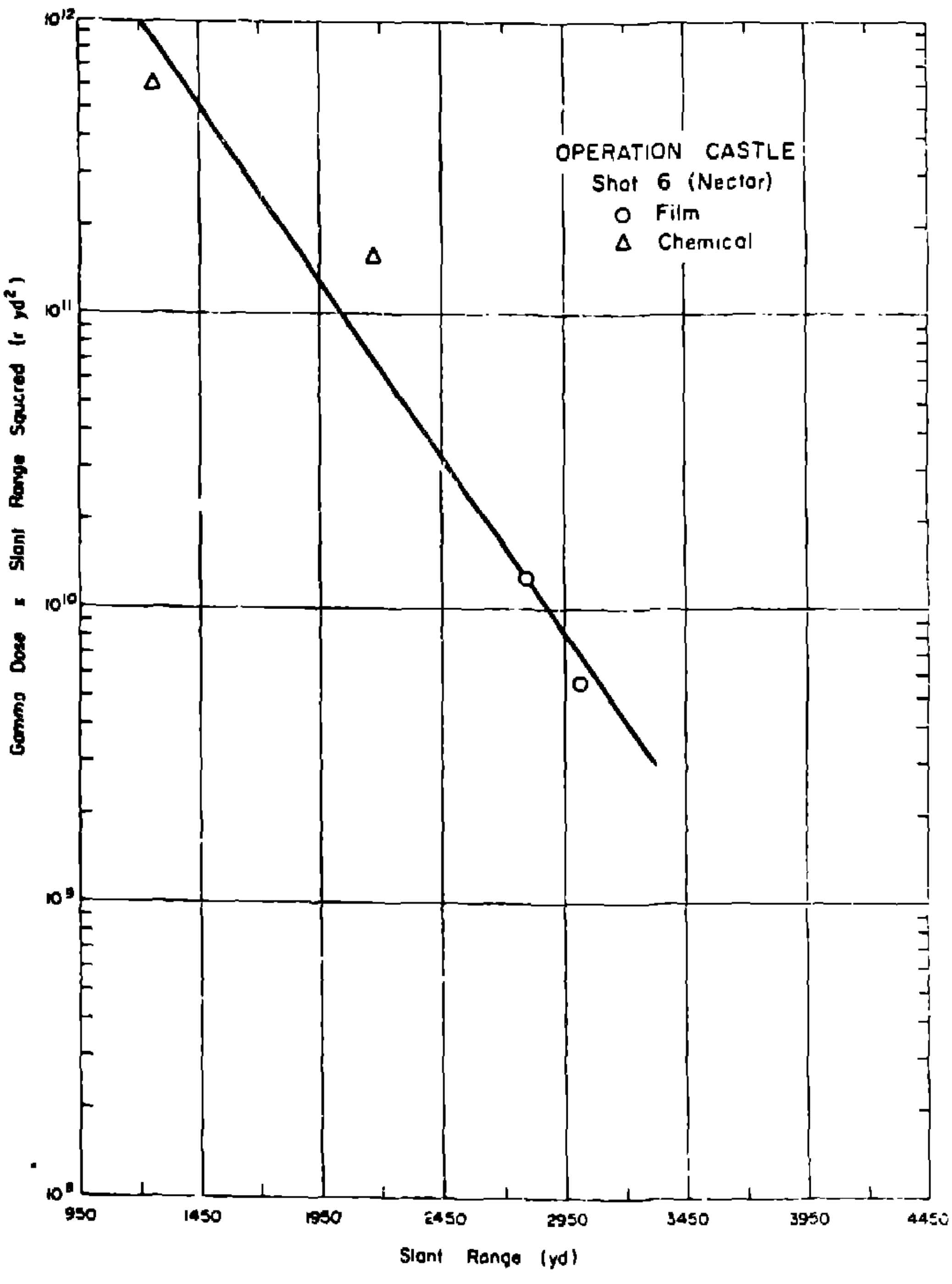


Figure 3.41 (S-RD) Operation Castle - Shot 6 (Nectar) - Gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

(S-RD) TABLE 3.65 SHOT INFORMATION - OPERATION TEAPOT

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total
			ft	kt
1 (Wasp)	18 Feb 1955 1960 GMT	Area T-7-4-Air	762	1.2
2 (Moth)	22 Feb 1955 1345 GMT	Area 3-Tower	300	2.4
3 (Tesla)	1 March 1955 1330 GMT	Area 9b-Tower	300	6.8
4 (Turk)	7 March 1955 1319:59 GMT	Area 2-Tower	500	44
5 (Hornet)	12 March 1955 1255 GMT	Area 3A-Tower	300	3.6
6 (Bee)	22 March 1955 1305 GMT	Area 7-1A-Tower	500	8.1
8 (Apple I)	29 March 1955 1255 GMT	Area 4-Tower	500	14.2
9 (Wasp Prime)	29 March 1955 1759:55 GMT	Area T-7-4-Air	740	3.2
10 (High Altitude)	6 April 1955 1800:04 GMT	Area T-5-Air	36,620 (MSL)	3.1
11 (Post)	9 April 1955 1230 GMT	Area 9c-Tower	300	1.45
12 (Met)	15 April 1955 1915 GMT	F.F.[b] - Tower	400	22.5
13 (Apple II)	5 May 1955 1210 GMT	Area 1-Tower	500	28
14 (Zucchini)	15 May 1955 1159:59 GMT	Area 7-1a-Tower	500	28

[a]Not reported.
[b]Frenchman's Flat.

(U) TABLE 3.44. METEOROLOGICAL DATA - OPERATION TEAPOT

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^a$
	mb	°K	g/cm³ x10³		
1 (Wasp)	[illegible]90[a] [illegible]46[b]	270[a] 267.5[b]	1.11	0.86	1.35
2 (Moth)	[illegible]40[a] 8[illegible]7[b]	265.2[a] 269.1[b]	1.14	0.88	1.29
3 (Tesla)	87[illegible][a] 8[illegible][b]	269.1[a] 272.5[b]	1.11	0.86	1.35
4 (Turk)	[illegible] 855[b]	278.2[a] 278.6[b]	1.08	0.83	1.45
5 (Hornet)	881[a] 874[b]	272[a] 27[illegible][b]	1.11	0.86	1.35
6 (Bee)	876[a] 860[b]	274[a] 277.5[b]	1.10	0.85	1.39
8 (Apple I)	[illegible][a] 852[b]	282.1[a] 282.3[b]	1.06	0.82	1.49
9 (Wasp Prime)	871[a] 845[b]	286.4[a] 285.4[b]	1.04	0.80	1.56
11 (Post)	874[a] 867[b]	274[a] 277.5[b]	1.10	0.85	1.39
12 (Met)	[illegible]08[a] 890[b]	292.5[a] 291.5[b]	1.06	0.82	1.49
13 (Apple II)	871[a] 855[b]	290.5[a] 284.6[b]	1.05	0.81	1.53
14 (Zucchini)	[illegible][a] 851[b]	276[a] 27[illegible][b]	1.09	0.84	1.42
15 (H.A.) at ground zero	842	2[illegible]3.3			

Canister #	Density g/cm³ x10³	Canister #	Density g/cm³ x10³
[illegible]	0.341	9	0.336
5	0.341	10	0.334
[illegible]	0.339	11	0.334
7	0.339	13	0.324
8	0.336	14	0.312
		15	0.302

[a] Ground conditions
[b] Burst height conditions

(U) TABLE 3.7 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 1 (WASP)

Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U	Au Thermal Correc-tion	Fast Correc-tion	Shield Type	Shield Correc-tion	Total Correc-tion	Cor-rected Gamma Dose	Atten-uation Factor	Final Corrected Gamma Dose	Soil Contri-bution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
290	a	545	43,000	2.93x10^12	2.3x10^12	[illegible]	[illegible]	306	8,000	b	560	8,985	34,100	1.0	34,100	3,360
443	a	545	6,400	1.40x10^12	1.70x10^12	4.1x10^11	8.51x10^11	175	2,310	b	267	2,752	3,650	1.0	3,650	682
739	a	1290	600	6.70x10^10	4.64x10^11	2.51x10^10	1.00x10^10	13.7	305	b	12.7	56.9	540	1.0	540	47
887	a	606	335	3.50x10^10	2.40x10^11	1.53x10^10	5.34x10^10	8.0	11.4	b	6.65	26.05	309	1.0	309	23
976	a	606	215	2.20x10^10	1.57x10^11	9.44x10^11	3.15x10^10	5.14	7.41	b	4.30	16.85	198	1.0	198	16
1,070	a	606	143	1.45x10^10	8.77x10^10	4.62x10^11	1.75x10^10	3.30	4.13	b	2.76	10.19	132	1.0	133	8.6
1,161	a	606	92	8.15x10^9	5.17x10^10	3.34x10^11	1.45x10^10	1.85	2.44	b	1.56	5.85	86	1.0	86	4.8
1,255	a	606	60	4.94x10^9	2.50x10^10	1.62x10^11	6.37x10^9	1.10	1.32	b	0.92	3.34	57	1.0	57	2.7
1,350	a	606	35	2.91x10^9	1.65x10^10	9.62x10^10	3.85x10^9	0.66	0.78	b	0.55	1.99	33	1.0	33	1.6
1,445	a	510	23	1.77x10^9	1.0x10^10	5.74x10^10	2.37x10^9	0.38	1.32	b	0.34	2.04	21	1.0	21	0.80
1,541	a	510	16	1.12x10^9	6.12x10^9	3.40x10^10	1.43x10^9	0.24	0.78	b	0.21	1.23	15	1.0	15	<0.90
1,638	a	510	12	7.09x10^8	3.73x10^9	2.09x10^10	8.96x10^8	0.15	0.40	b	0.13	0.68	11	1.0	11	<0.80
1,833	a	502	5.5	2.92x10^8	1.4x10^9	[illegible]	3.57x10^8	0.07	0.03	b	0.06	0.16	5.3	1.0	5.3	<0.80
2,029	a	502	2.65	1.21x10^8	[illegible]	[illegible]	1.50x10^8	0.03	0.01	b	0.02	0.06	2.59	1.0	2.59	<0.80

a Unknown.

b NBS film holder attached to stake.

(U) TABLE 3.65 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 2 (MOTH)

Slant Range	Azi-muth	Film Type	Uncor-rected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U	Au Thermal Correc-tion	Fast Correc-tion	Shield Type	Shield Correc-tion	Total Correc-tion	Cor-rected Gamma Dose	Atten-uation Factor	Final Corrected Gamma Dose	Soil Contri-bution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r	r	r	r
412	c	548	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	441	2810	b	790	4,061	5,520	1.0	5,520	1,100
510	c	548	4,000	[illegible]	[illegible]	[illegible]	[illegible]	123	1210	b	219	1,552	2,450	1.0	2,450	380
605	c	606, 1290	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.86, 8.00	7.05, 12.2	b	7.92	[illegible]	[illegible]	1.0	433, 397	16
1,072	c	606, 1290	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	13.08, 15.80	[illegible]	1.0	[illegible]	[illegible]
1,164	c	606, 1290	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	6.00, 7.82	[illegible]	1.0	[illegible], 148	4.7
[illegible]	c	606	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.05	[illegible]	b	0.61	4.08	109	1.0	108	3.0
1,503	c	606	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.45	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	73	[illegible]
1,402	c	606	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.36	[illegible]	b	[illegible]	1.04	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	c	510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	0.72	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	c	510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.16	[illegible]	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,701	c	510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.57	[illegible]	b	[illegible]	0.170	10.7	1.0	10.7	[illegible]
[illegible]	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	[illegible]	7.3	[illegible]
[illegible]	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

c Unknown.

d Film holder attached to stake.

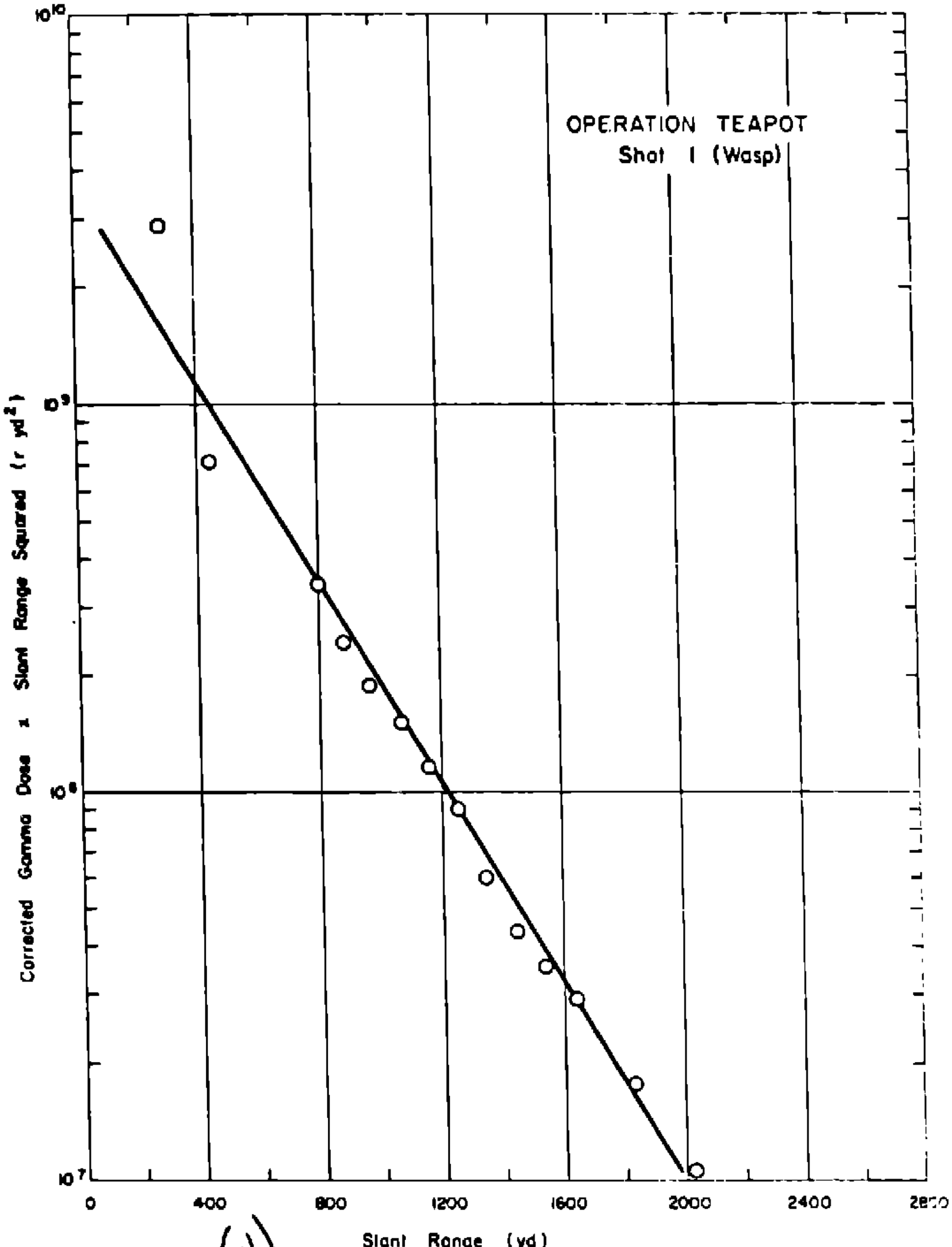
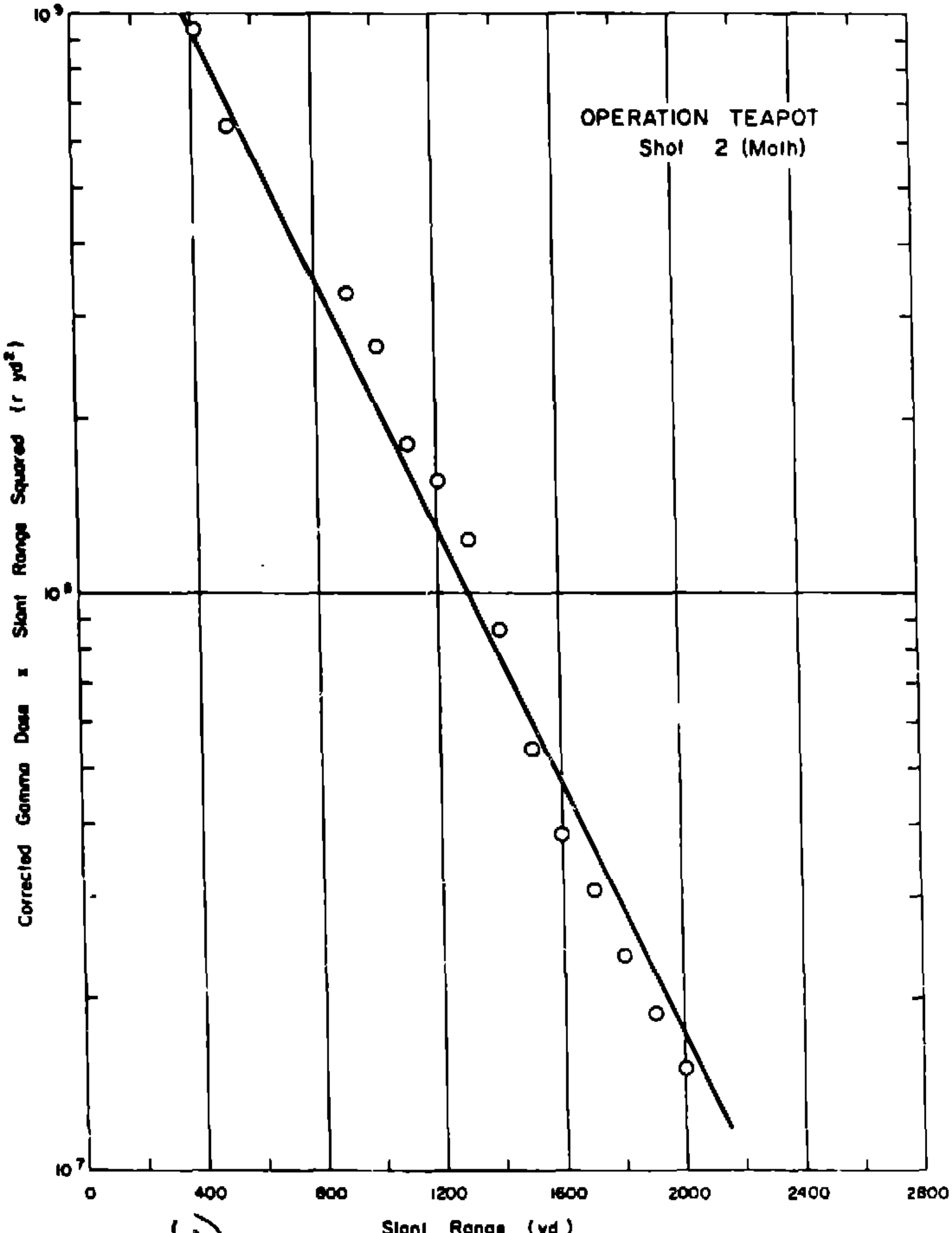


Figure 3.42 ~~(S-RD)~~ (U) Operation Teapot - Shot 1 (Wasp) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).



(U)

Figure 3.43 ~~(S-RD)~~ Operation Teapot - Shot 2 (Moth) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.69 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 3 (TESLA)

Blast Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu[a]	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm^2	n/cm^2	r	r		r	r	r		r	r
511	a	548-0	19,500	7.66×10^{12}	1.3×10^{12}	870	4,500	b	1,460	6,830	12,700	1.0	12,700	1,780
609	a	548-0	9,600	3.37×10^{12}	6.4×10^{12}	383	2,200	b	640	3,223	6,380	1.0	6,380	805
715	a	548-0	4,400	1.45×10^{12}	3.2×10^{11}	165	1,100	b	276	1,541	2,860	1.0	2,860	366
806	a	548-0	3,000	7.38×10^{11}	1.6×10^{11}	83.9	620	b	140	843.9	2,160	1.0	2,160	195
1,145	a	1290	465	6.87×10^{10}	2.0×10^{11}	14.0	11	b	13.1	38.1	427	1.0	427	20
1,230	a	606, 1290	310	4.04×10^{10}	1.5×10^{11}	9.18, 8.24	4.6, 7.2	b	7.67	21.45, 23.21	288, 287	1.0	288, 287	10
1,316	a	606, 1290	205	2.31×10^{10}	8.2×10^{10}	5.25, 4.71	2.9, 4.6	b	4.39	12.54, 13.70	192, 191	1.0	192, 191	7.9
1,404	a	606	135	1.37×10^{10}	5.0×10^{10}	3.11	1.6	b	2.80	7.51	127	1.0	127	4.6
1,494	a	606	95	7.62×10^{9}	2.5×10^{10}	1.73	0.89	b	1.45	3.07	92	1.0	92	2.9
1,585	a	606	63	4.38×10^{9}	1.9×10^{10}	1.00	0.68	b	0.83	2.51	60	1.0	60	1.6
1,678	a	606	40	2.46×10^{9}	1.1×10^{10}	0.56	0.31	b	0.47	1.34	39	1.0	39	0.52
1,771	a	510	25	1.43×10^{9}	6.6×10^{9}	0.31	0.33	b	0.27	0.91	24	1.0	34	0.31

[a] $Pu\ flux = \frac{S(I) \times Pu\ (II)}{S(II)}$

[a] −180° or 0° to weapon's linear axis.

[b] EX3 film holder attached to angle-iron stake.

(U) TABLE 3.70 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 4 (TURK)

Blast Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
			r	n/cm^2	n/cm^2	
1,519	a	1290	570	No data	No data	b
1,615	a	1290, 606	385	No data	No data	b
1,714	a	1290, 606	280	No data	No data	b
1,741	a	1290, 606	240	No data	No data	b
1,776	a	1290, 606	200	No data	No data	b
1,845	a	[illegible]	150	No data	No data	b
1,871	a	[illegible]	125	No data	No data	b
[illegible]	a	[illegible]	107	No data	No data	b
[illegible]	a	[illegible]	[illegible]	No data	No data	b
[illegible]	a	[illegible]	[illegible]	No data	No data	b
[illegible]	a	[illegible]	[illegible]	No data	No data	b
[illegible]	a	[illegible]	[illegible]	No data	No data	b
[illegible]	a	[illegible]	[illegible]	No data	No data	b
[illegible]	a	[illegible]	[illegible]	No data	No data	b

[a] Unknown.

[b] EX3 film badge attached to angle-iron stake.

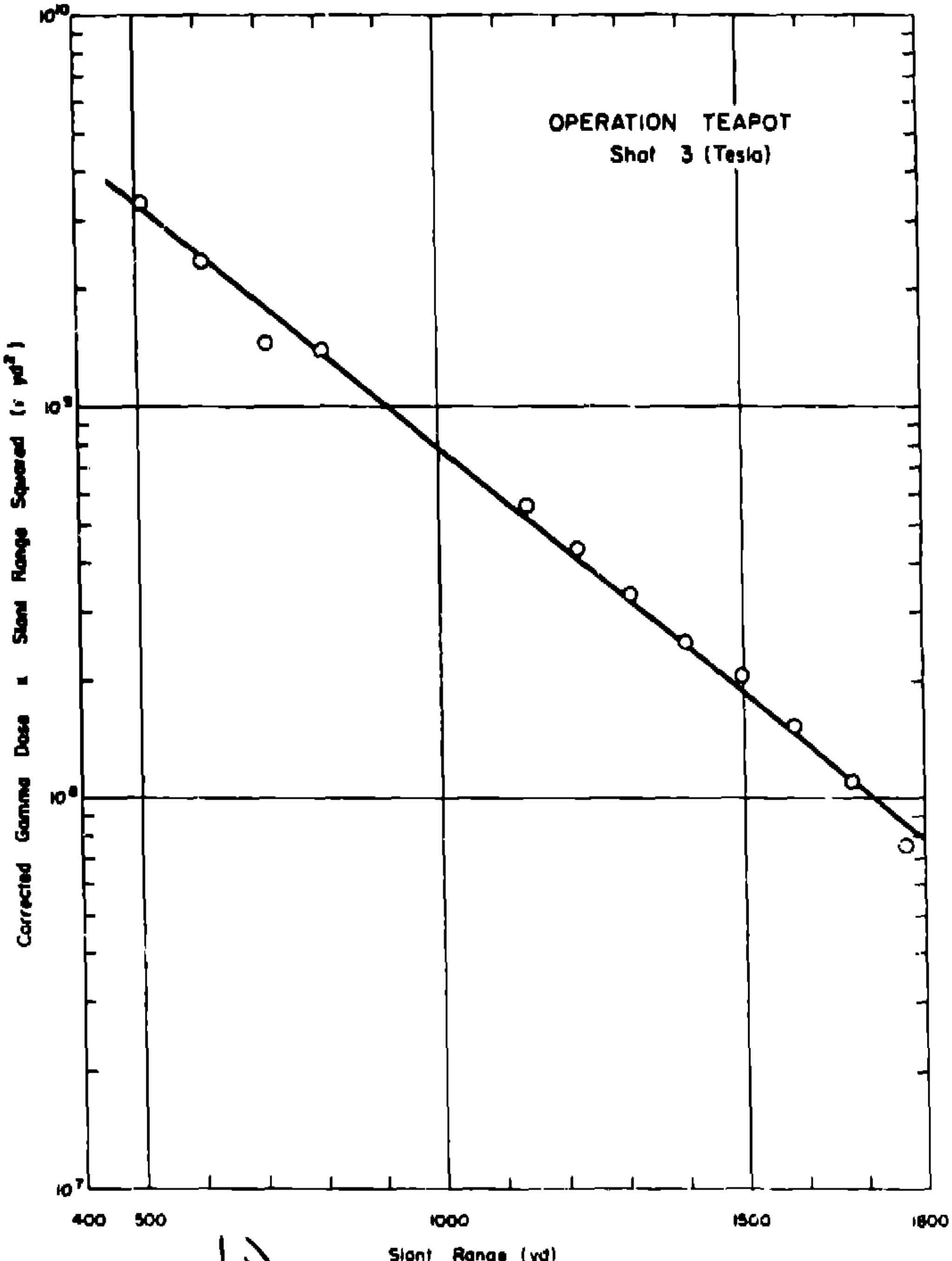
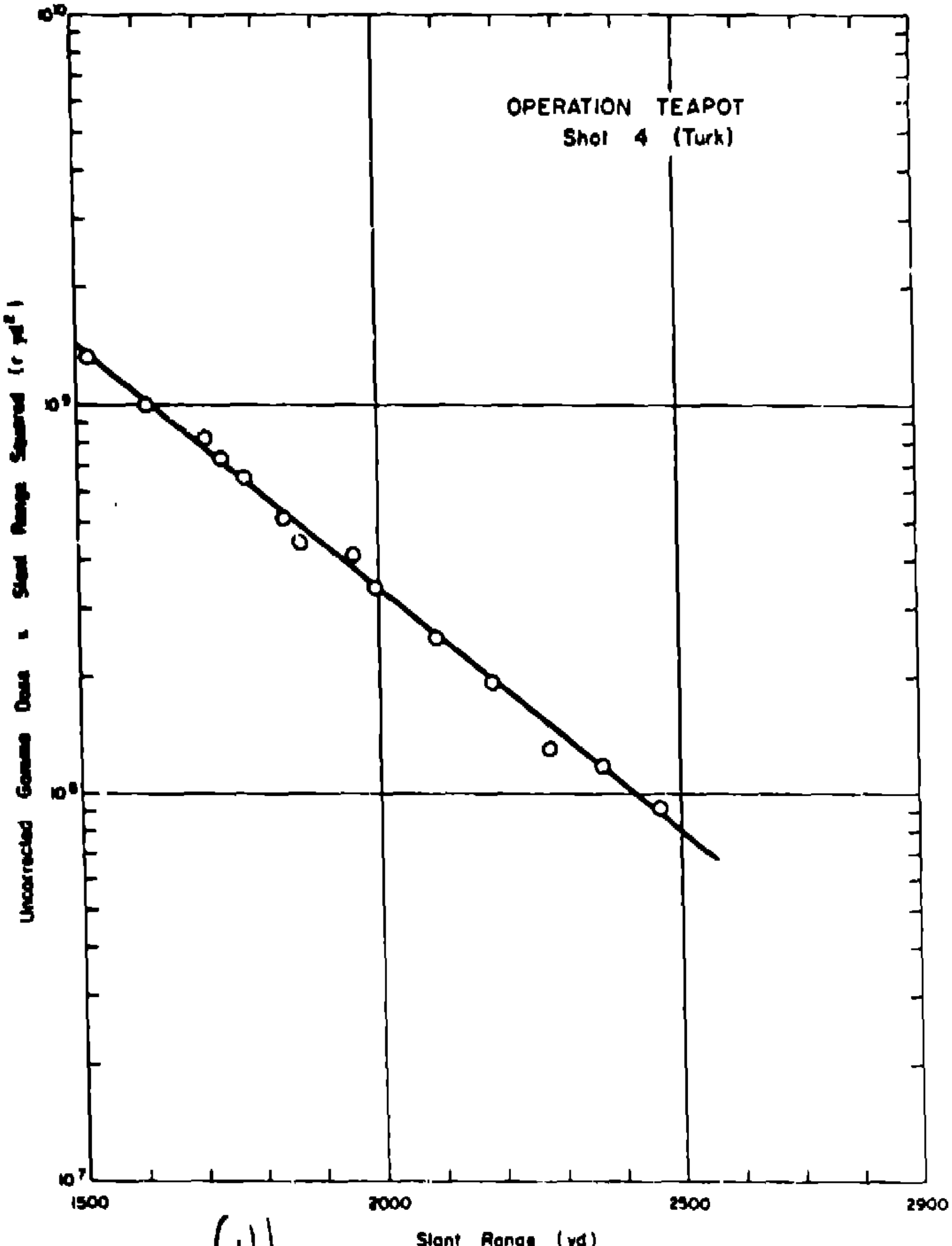


Figure 3.44 (U) ~~(S-RD)~~ Operation Teapot - Shot 3 (Tesla) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).



(U)

Figure 3.45 ~~(S-RD)~~ Operation Teapot - Shot 4 (Turk) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.71 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT [illegible] ([illegible])

Slant Range	Alti-tude	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
275	a	548-0	67,000	[illegible]	6.61x10[illegible]	[illegible]	1.86x10[illegible]
420	a	548-0	[illegible]	4.36x10[illegible]	3.46x10[illegible]	7.22x10[illegible]	4.19x10[illegible]
505	a	548-0	[illegible]	2.20x10[illegible]	7.06x10[illegible]	3.53x10[illegible]	1.96x10[illegible]
[illegible]	a	549-0	[illegible]	1.24x10[illegible]	4.46x10[illegible]	2.26x10[illegible]	1.27x10[illegible]
600	a	548-0	[illegible]	7.14x10[illegible]	3.03x10[illegible]	1.57x10[illegible]	[illegible]
665	a	548-0	[illegible]	4.40x10[illegible]	1.77x10[illegible]	[illegible]	[illegible]
795	a	1290	[illegible]	5.35x10[illegible]	2.12x10[illegible]	[illegible]	[illegible]
1,005	a	1290	550	5.05x10[illegible]	[illegible]	1.17x10[illegible]	[illegible]
1,054	a	1290	395	3.69x10[illegible]	1.44x10[illegible]	[illegible]	[illegible]
1,104	a	1290, 606	325	2.70x10[illegible]	1.05x10[illegible]	6.39x10[illegible]	1.11x10[illegible]
1,153	b	1290, 606	245	1.99x10[illegible]	7.69x10[illegible]	4.81x10[illegible]	2.55x10[illegible]
1,203	a	1290, 606	187	1.45x10[illegible]	5.72x10[illegible]	[illegible]	1.88x10[illegible]
1,303	a	1290, 606	125	8.00x10[illegible]	3.15x10[illegible]	2.00x10[illegible]	9.41x10[illegible]
1,402	a	606	74.0	4.42x10[illegible]	1.75x10[illegible]	1.17x10[illegible]	5.33x10[illegible]
1,502	a	606	[illegible]	2.43x10[illegible]	9.73x10[illegible]	[illegible]	[illegible]
1,602	a	606	[illegible]	1.36x10[illegible]	[illegible]	[illegible]	[illegible]
1,701	a	510	21.0	[illegible]	3.11x10[illegible]	2.35x10[illegible]	9.09x10[illegible]
1,801	a	510	15.0	4.57x10[illegible]	1.79x10[illegible]	1.39x10[illegible]	5.71x10[illegible]
1,901	a	510	10.0	2.63x10[illegible]	1.06x10[illegible]	8.31x10[illegible]	3.32x10[illegible]
2,000	a	510	7.0	1.53x10[illegible]	6.04x10[illegible]	5.00x10[illegible]	1.95x10[illegible]
2,100	a	502	5.0	[illegible]	3.47x10[illegible]	[illegible]	1.13x10[illegible]

Slant Range	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
275	5,020	22,800	b	9,110	[illegible]	30,100	1.0	30,100	11,300
420	723	5,100	b	1,380	[illegible]	9,460	1.0	9,460	1,560
505	250	2,430	b	457	3,137	5,660	1.0	5,660	755
[illegible]	141	1,540	b	257	1,938	4,310	1.0	4,310	452
600	89.1	1,050	b	160	1,301.1	3,020	1.0	3,000	291
665	50.9	610	b	92.7	753.6	2,550	1.0	2,550	169
795	10.9	15.5	b	11.1	37.5	625	1.0	625	20
1,005	10.3	15.0	b	10.9	36.2	514	1.0	514	10
1,054	7.51	11.1	b	7.63	26.26	369	1.0	369	13
1,104	6.14, 5.51	5.01, 8.12	b	[illegible]	16.71, 19.19	308, 306	1.0	308, 306	9.4
1,153	4.52, 4.06	4.02, 5.02	b	4.16	12.60, 13.22	232, 232	1.0	232, 232	7.0
1,203	3.30, 2.96	2.96, 3.87	b	3.05	9.31, 9.88	178, 177	1.0	178, 177	5.2
1,303	1.82, 1.63	2.06, 2.75	b	1.64	5.52, 6.02	120, 119	1.0	120, 119	2.7
1,402	1.01	0.93	b	0.92	2.86	76.4	1.0	76.4	1.6
1,502	0.55	0.35	b	0.50	1.40	42.5	1.0	42.5	0.65
1,602	0.31	0.19	b	0.28	0.78	29.4	1.0	29.4	<0.05
1,701	0.17	0.11	b	0.16	0.44	20.4	1.0	20.4	<0.05
1,801	0.10	0.064	b	0.10	0.264	14.7	1.0	14.7	<0.05
1,901	0.057	0.051	b	0.050	0.158	9.86	1.0	9.86	<0.05
2,000	0.040	0.030	b	0.029	0.099	6.9	1.0	6.9	<0.05
2,100	0.022	[illegible]	b	0.017	[illegible]	5.0	1.0	5.0	<0.05

a Unknown.
b NBS film holder attached to stake.

(U) TABLE 3.72 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 6 ([illegible])

Slant Range	Alti-tude	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
527	a	548-0	30,500	7.55x10[illegible]	4.75x10[illegible]	2.01x10[illegible]	8.45x10[illegible]
622	a	548-0	13,100	[illegible]	[illegible]	[illegible]	[illegible]
760	a	548-0	[illegible]	[illegible]	1.04x10[illegible]	4.25x10[illegible]	1.83x10[illegible]
[illegible]	a	548-0	[illegible]	9.15x10[illegible]	5.10x10[illegible]	2.10x10[illegible]	9.15x10[illegible]
[illegible]	a	548-0	[illegible]	[illegible]	2.51x10[illegible]	1.09x10[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,410	a	[illegible]	280	[illegible]	[illegible]	[illegible]	[illegible]
1,504	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Slant Range	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
527	858	16,400	b	1,440	[illegible]	11,600	1.0	11,500	4,800
622	390	[illegible]	b	[illegible]	[illegible]	4,610	1.0	4,610	2,120
760	200	[illegible]	b	[illegible]	4,125	3,000	1.0	[illegible]	991
[illegible]	104	[illegible]	b	174	2,038	1,900	1.0	[illegible]	450
[illegible]	53.0	[illegible]	[illegible]	[illegible]	1,003	1,440	1.0	[illegible]	231
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	27.41, 30.70	[illegible]	1.0	[illegible]	[illegible]
1,410	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible], 223	1.0	[illegible], 223	[illegible]
1,504	[illegible], 2.8	2.71, 4.00	b	[illegible]	[illegible]	[illegible], 140	1.0	[illegible], 140	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	103	[illegible]
[illegible]	1.08	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	71	1.7
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	0.37	0.27	b	[illegible]	[illegible]	31	1.0	31	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	17	1.0	17	[illegible]
[illegible]	0.12	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	11	1.0	11	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	b	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]

[illegible]

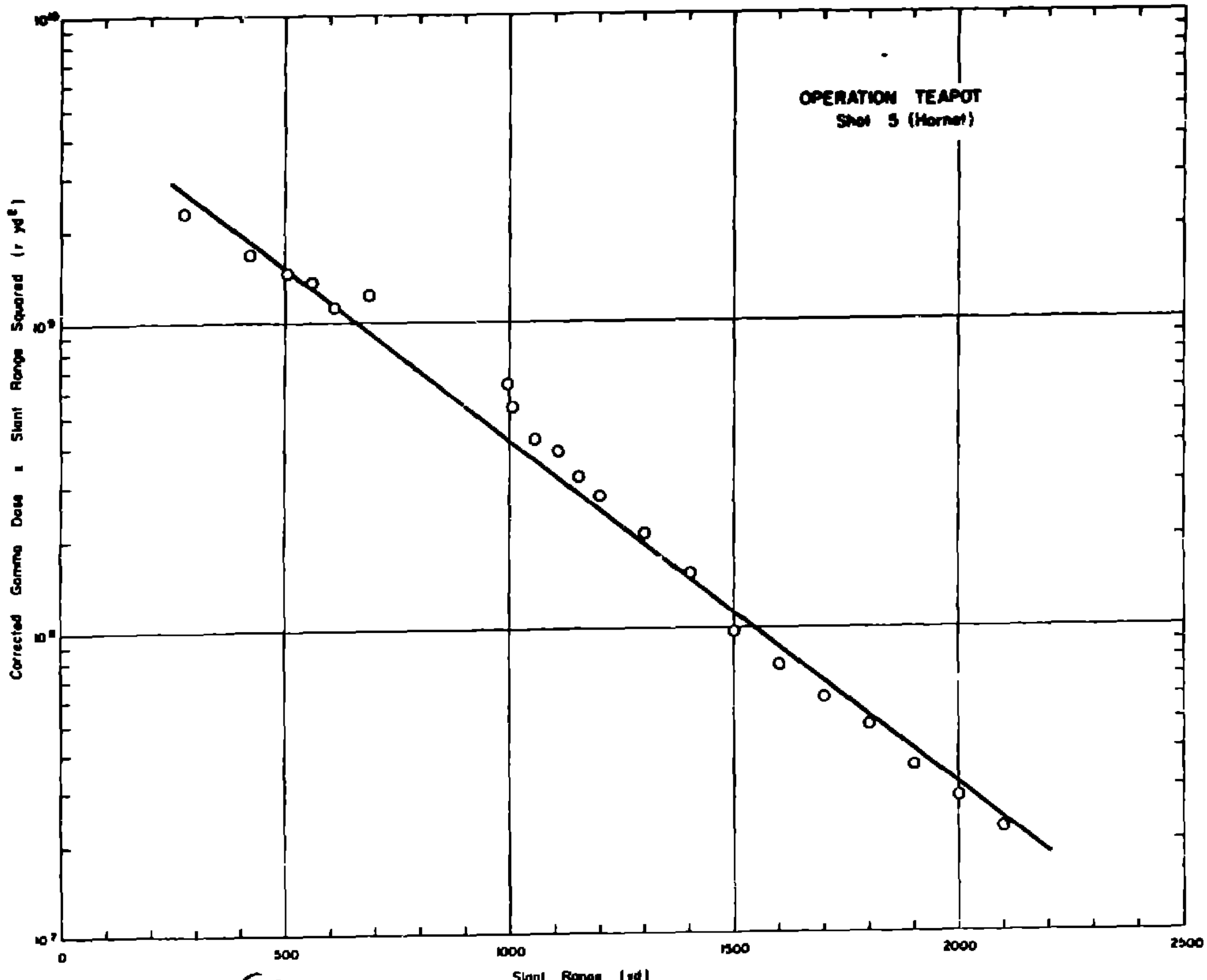


Figure 3.46 ~~(S-RD)~~ (U) Operation Teapot - Shot 5 (Hornet) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

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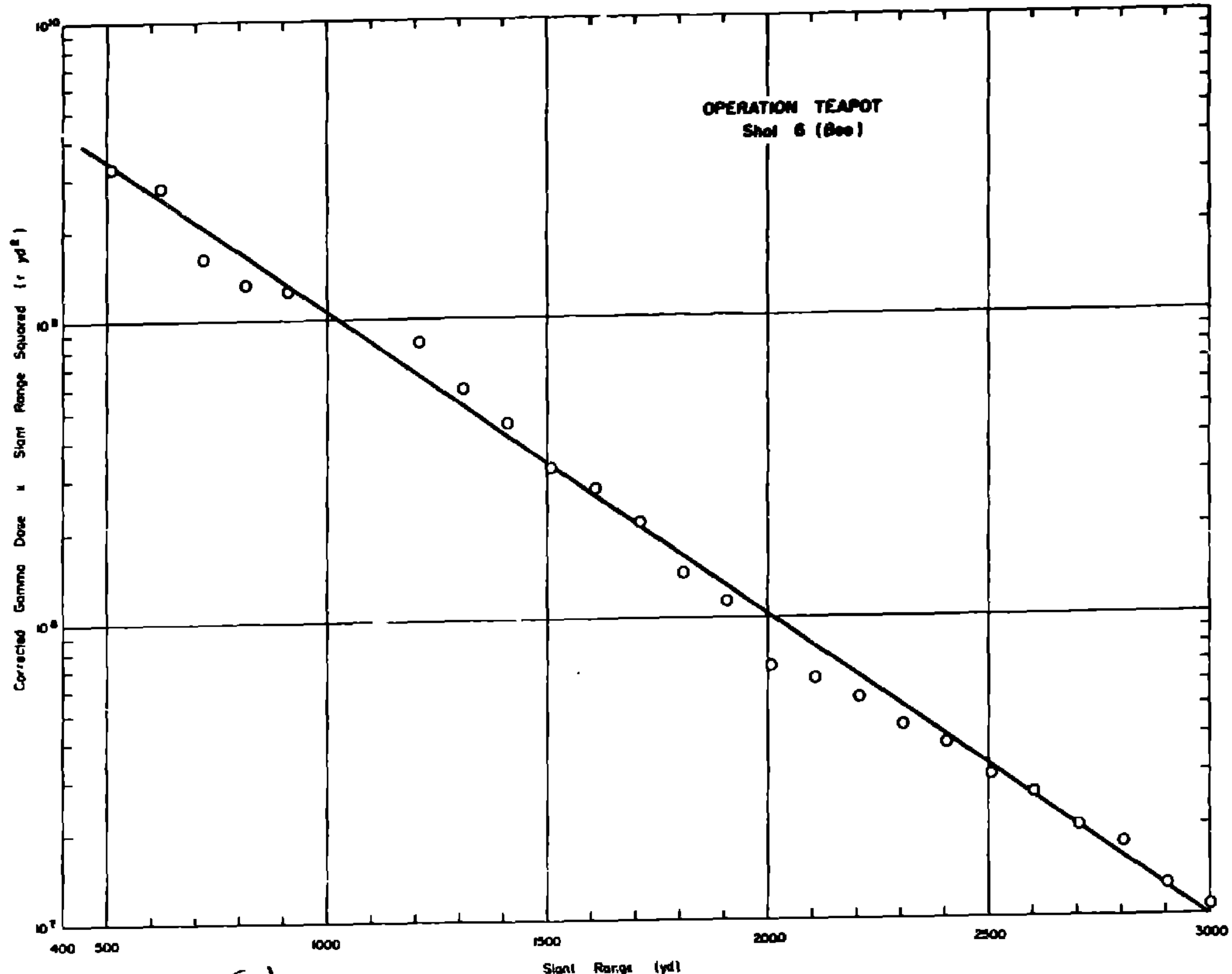


Figure 3.47 (U) ~~(S RD)~~ Operation Teapot - Shot 6 (Bee) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.73 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 6 (APPLE I)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	r	r		r	r	r		r	r
1,410	a	1290	347	7.39×10^{8}	1.51	6.3	b	1.4	9.21	338	1.0	338	7.4
1,509	a	1290	225	4.12×10^{8}	0.84	5.2	b	0.79	6.83	218	1.0	218	5.3
1,609	a	1290	147	2.36×10^{8}	0.48	3.9	b	0.45	4.93	142	1.0	142	3.2
1,708	a	606	100	1.34×10^{8}	0.30	1.8	b	0.26	2.36	98	1.0	98	1.7
1,808	a	606	67	7.65×10^{7}	0.17	1.2	b	0.14	1.51	65	1.0	65	1.2
1,858	a	606	55	5.67×10^{7}	0.13	0.96	b	0.11	1.20	54	1.0	54	<1.2
1,908	a	606	47	4.40×10^{7}	0.10	0.73	b	0.08	0.91	46	1.0	46	<1.2
1,958	a	606	39	3.34×10^{7}	0.08	0.62	b	0.06	0.76	38	1.0	38	<1.2
2,007	a	606	32	2.56×10^{7}	0.06	0.46	b	0.05	0.57	31	1.0	31	<1.2
2,057	a	510	24	1.97×10^{7}	0.04	0.39	b	0.04	0.47	23	1.0	23	<1.2
2,107	a	510	20	1.49×10^{7}	0.03	0.31	b	0.03	0.37	20	1.0	20	<1.2
2,200	a	1290, 606, 510	16, 14, 12	9.09×10^{6}	0.02, 0.02, 0.02	0.28, 0.21, 0.28	b	0.02	0.32, 0.25, 0.32	16, 14, 12	1.0	16, 14, 12	<1.2
2,400	a	510, 502	9, 7.6	3.13×10^{6}	0.007, 0.007	0.12, 0.03	b	0.006	0.133 0.043	9, 7.6	1.0	9, 7.6	<1.2
2,600	a	510, 502	5, 4.2	1.12×10^{6}	<0.007, <0.007	<0.12, <0.03	b	<0.006	<0.133, <0.043	5, 4.2	1.0	5, 4.2	<1.2
2,800	a	510, 502	2.8, 2.3	4.08×10^{5}	<0.007, <0.007	<0.12, <0.03	b	<0.006	<0.133 <0.043	2.8, 2.3	1.0	2.8, 2.3	<1.2
3,000	a	510, 502	1.6, 1.5	1.47×10^{5}	<0.007, <0.007	<0.12, <0.03	b	<0.006	<0.133 <0.043	1.6, 1.5	1.0	1.6, 1.5	<1.2
3,300	a	502	0.82	3.35×10^{4}	<0.007, <0.007	<0.12. <0.03	b	<0.006	<0.133	<0.043 0.82	1.0	0.82	<1.2

[a]Unknown.
[b]NBS film holder attached to stake.

(U) TABLE 3.74 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 9 (WASP PRIME)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r		n/cm²	n/cm²	n/cm²	r	r		r		r		r	r
280	a	b	72,000	3.80×10^{12}	1.12×10^{14}	5.99×10^{14}	2.13×10^{12}	25,300	a	c	1,080	26,380	45,600	1.05	47,900	20,400
380	a	b	29,400	[illegible]	4.44×10^{13}	2.34×10^{13}	1.01×10^{12}	8,670	a	c	371	9,041	17,400	1.05	18,300	6,900
460	a	b	14,000	7.51×10^{12}	2.22×10^{14}	1.16×10^{13}	5.71×10^{10}	5,000	a	c	224	5,224	8,780	1.05	9,220	3,250
520	a	b	10,000	3.91×10^{12}	1.43×10^{13}	7.01×10^{12}	3.53×10^{10}	2,600	a	c	111	2,711	7,290	1.05	7,660	1,800
600	a	b	[illegible]	1.90×10^{12}	7.52×10^{12}	4.39×10^{12}	1.92×10^{12}	1,270	a	c	54.1	1,324.1	3,880	1.05	4,070	928
712	a	b	3,000	8.72×10^{11}	3.64×10^{12}	1.77×10^{12}	8.73×10^{11}	580	a	c	24.8	604.8	3,000	1.05	3,150	416
835	a	b	1,500	2.21×10^{11}	1.54×10^{12}	7.56×10^{11}	2.21×10^{11}	147	a	c	6.26	153.26	1,350	1.05	1,420	148
945	a	b	890	1.70×10^{11}	7.82×10^{11}	3.54×10^{11}	1.70×10^{11}	113	a	c	4.84	117.84	772	1.05	811	81.4
995	a	b	650	1.21×10^{11}	6.01×10^{11}	2.02×10^{11}	1.21×10^{11}	80.0	a	c	3.41	83.41	567	1.05	595	61.2
1,045	a	b	600	8.70×10^{10}	4.43×10^{11}	1.91×10^{11}	8.72×10^{10}	58.0	a	c	2.48	60.48	540	1.04	562	45.0
1,100	a	b	400	6.21×10^{10}	3.31×10^{11}	1.40×10^{11}	[illegible]	41.3	a	c	1.76	43.06	357	[illegible]	371	[illegible]
1,154	a	1290, 606	[illegible]	4.51×10^{10}	2.33×10^{11}	1.02×10^{11}	4.51×10^{10}	10.3, 9.20	7.17, 11.1	d	9.40	26.82, [illegible]	[illegible]	1.0	[illegible]	[illegible]
1,252	a	1290, 606	200	2.15×10^{10}	1.27×10^{11}	5.54×10^{10}	2.15×10^{10}	5.57, 5.00	3.97, 6.05	d	5.11	14.65, 16.16	[illegible]	1.0	[illegible]	[illegible]
1,349	a	1290, 606	131	1.37×10^{10}	7.03×10^{10}	3.08×10^{10}	1.37×10^{10}	3.17, 2.80	2.20, 3.35	d	[illegible]	[illegible]	[illegible]	1.0	123, 122	6.00
1,447	a	606	[illegible]	7.62×10^{9}	3.86×10^{10}	1.71×10^{10}	7.62×10^{9}	1.73	[illegible]	d	1.45	4.39	81	1.0	81	3.60
1,546	a	606	[illegible]	[illegible]	[illegible]	9.67×10^{9}	[illegible]	1.00	0.18	d	[illegible]	1.51	53	1.0	53	2.01
1,646	a	606	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	d	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
1,744	a	510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.30	[illegible]	d	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0
1,844	a	510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.17	0.17	d	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0
2,040	a	502, 510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.07, 0.06	[illegible], 0.08	d	[illegible]	[illegible]	9.0, 7.8	1.0	9.0, 7.8	<1.0
2,240	a	502, 510	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible], 0.02	0.01, 0.04	d	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0
2,440	a	502, 510	2.5, [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.008, 0.007	[illegible], 0.000	d	[illegible]	[illegible]	[illegible]	1.0	[illegible]	<1.0
2,640	a	502, 510	1.4, [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.008, 0.007	<0.0[illegible], 0.006	d	[illegible]	<0.026	[illegible]	1.0	[illegible]	<1.0
2,840	a	502	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.008, 0.007	[illegible]	d	[illegible]	<0.016	[illegible]	1.0	0.73	<1.0
3,040	a	502	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<0.007, 0.007	[illegible]	d	[illegible]	<0.016	[illegible]	1.0	0.60	<1.0

[a]Unknown.
[b]Chloroform chemical dosimeter data.
[c][illegible] Al box.
[d]NBS film holder attached [illegible]

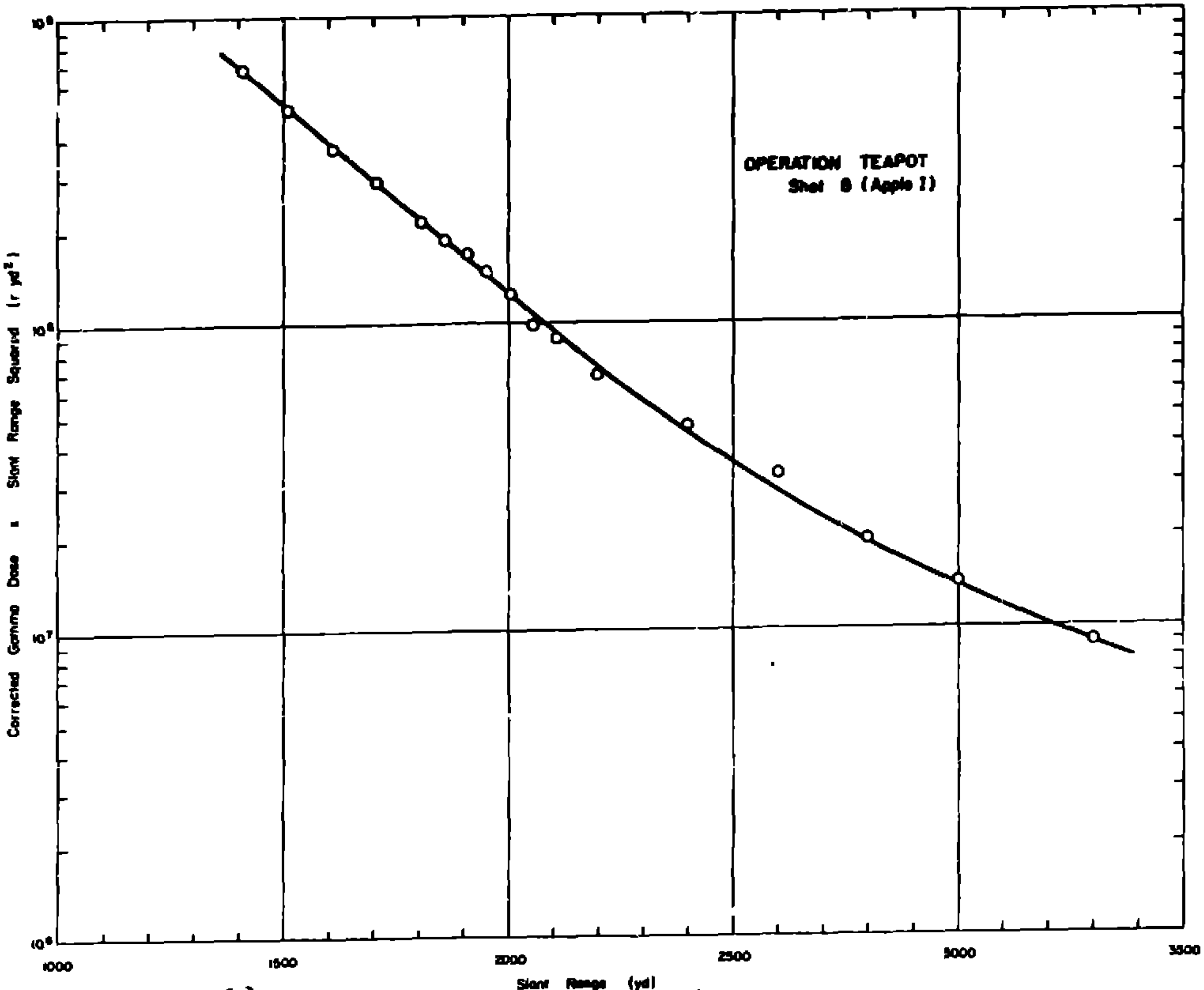
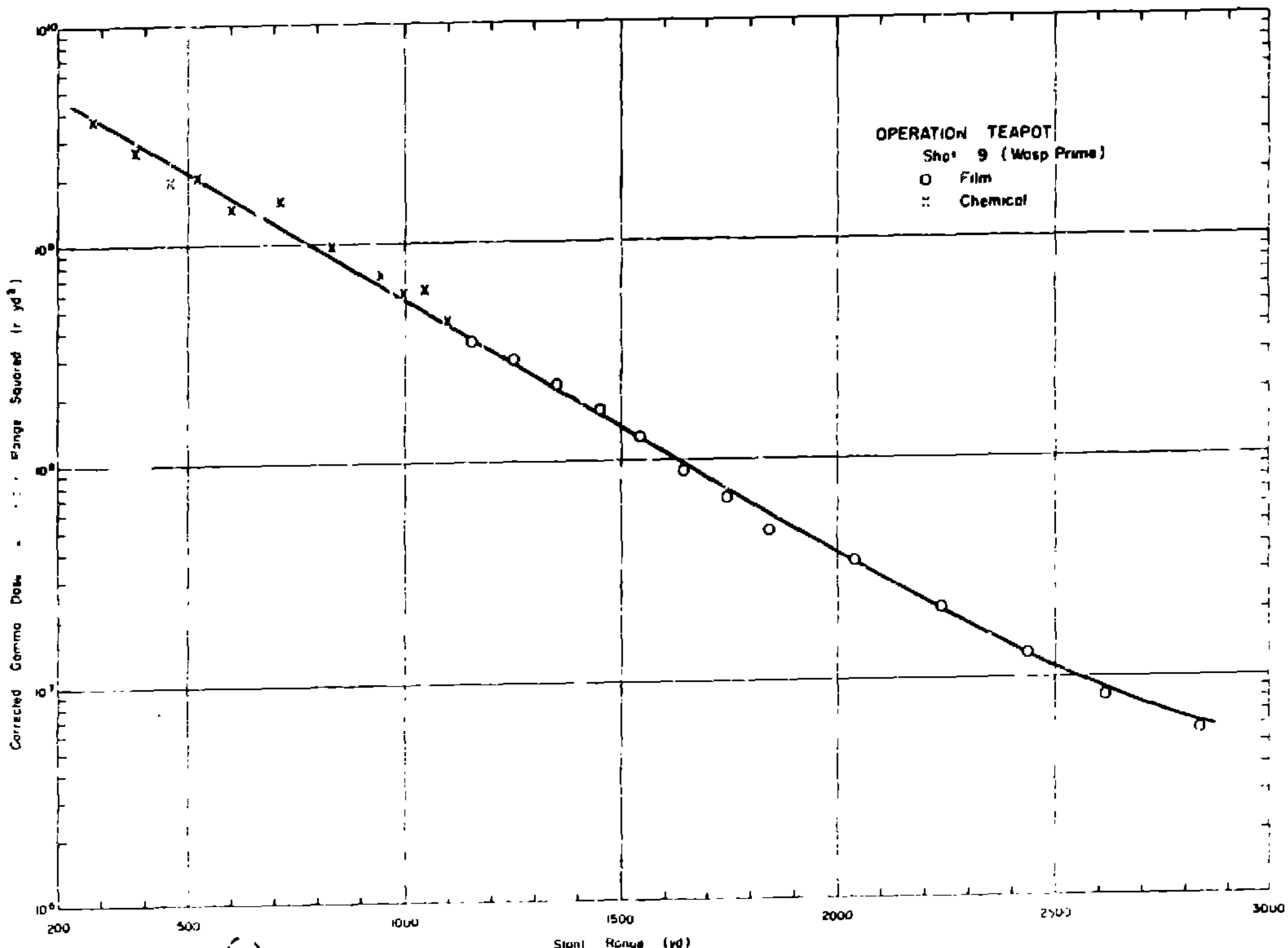


Figure 3.48 (S-RD) (U) Operation Teapot - Shot 8 (Apple I) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).



(U)
Figure 3.49 (S-RD) Operation Teapot - Shot 9 (Wasp Prime) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

TABLE 3.7[illegible] [illegible] DATA [illegible] (HIGH ALTITUDE)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: [illegible]	Neutron Flux: U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
310	a	b	1?7,000	1.30x10[illegible]	1.30x10[illegible]	[illegible]	2.00x10[illegible]
347	a	b	108,000	4.[illegible]	4.30x10[illegible]	2.60x10[illegible]	[illegible]
4?7	a	b	[illegible]	[illegible]x10[illegible]	3.10x10[illegible]	1.60x10[illegible]	7.3x10[illegible]
[illegible]	a	b	44,000	[illegible].20x10[illegible]	[illegible]x10[illegible]	1.[illegible]x10[illegible]	5.81x10[illegible]
67?	a	[illegible]	27,[illegible]	[illegible].70x10[illegible]	1.5[illegible]x10[illegible]	7.8[illegible]	[illegible]x10[illegible]
[illegible]	a	[illegible]	1?,[illegible]	[illegible]x10[illegible]	[illegible]x10[illegible]	[illegible]	[illegible]
1,040	a	54-[illegible]	[illegible]	1.[illegible]x10[illegible]	[illegible]	[illegible]	[illegible]
1,235	a	54[illegible]	[illegible]	1.[illegible]x10[illegible]	4.[illegible]	1.[illegible]x10[illegible]	[illegible]
2,446	a	12 AU, [illegible]	[illegible]	[illegible]x10[illegible]	4.[illegible]	1.[illegible]	4.[illegible]
3,520	a	[illegible]		[illegible]x10[illegible]	1.[illegible]x10[illegible]	1.[illegible]x10[illegible]	[illegible]
4,21?	a	[illegible]		[illegible]x10[illegible]	2.[illegible]	[illegible]	[illegible]

Slant Range	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
310	7,330	a	c	a	7,330	180,000	a	180,000	d
347	2,830	a	c	a	2,830	105,000	a	105,000	d
4?7	3,730	a	c	a	3,730	56,700	a	56,700	d
[illegible]	3,470	a	c	a	3,470	40,500	a	40,500	d
67?	4.0	5,?40	c	a	5,?60	21,600	a	21,600	d
[illegible]	25?	3,350	c	a	3,[illegible]	9,390	a	9,390	d
1,040	156	2,230	c	a	2,380	6,420	a	6,420	d
1,235	80.2	1,470	c	a	1,[illegible]	[illegible]	a	3,950	d
2,446	8.76, 7.8	28.7, [illegible]	c	a	[illegible], [illegible]	318, 309	a	318, 309	d
3,520	1.47	4.10	c	a	5.[illegible]	76	a	6	d
4,21?	0.27	1.01	c	a	1.28	[illegible]9	a	[illegible]9	d

[a]Unknown.

[b]Chloroform chemical dosimeter data.

[c]Steel instrumentation [illegible] canisters.

[d]No data since the neutron data were taken at altitudes and not on the ground.

(U)

TABLE 3.76 INITIAL GAMMA DOSE DATA – [illegible], SHOT [illegible] ([illegible])

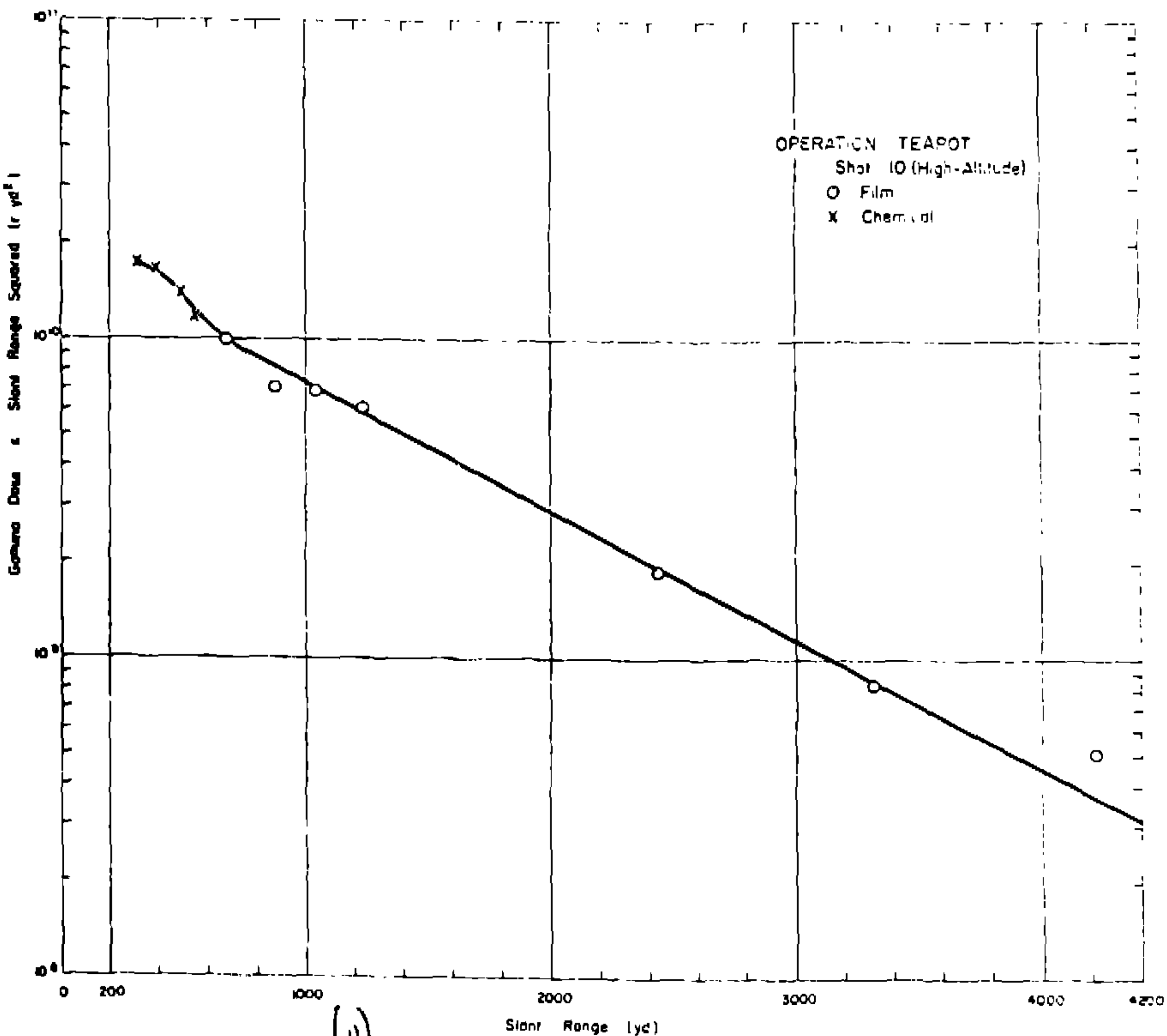
Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: [illegible]	Neutron Flux: U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
310	a	[illegible]	[illegible]	[illegible]x10[illegible]	[illegible]	2.[illegible]	[illegible]x10[illegible]
412	a	12[illegible]	[illegible]	[illegible]x10[illegible]	1.[illegible]x10[illegible]	1.06x10[illegible]	3.[illegible]
510	a	12 [illegible]	[illegible]	[illegible]x10[illegible]	[illegible]	[illegible]x10[illegible]	1.[illegible]x10[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]x10[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]x10[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	a	[illegible]	[illegible]	[illegible]x10[illegible]	[illegible]	[illegible]	[illegible]
1,04?	a	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,100	a	[illegible]	[illegible]	[illegible]x10[illegible]	[illegible]	[illegible]	[illegible]
1,177	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1,25?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Slant Range	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
310	1,140	17,600	c	1,910	20,650	0	1.0	0	5,430
412	780	1,[illegible]	c	[illegible]	2,798	~6,000	1.0	6,000	1,[illegible]
510	137	[illegible]	c	315	1,1??	~6,700	1.0	6,700	70[illegible]
[illegible]	9[illegible]	1,[illegible]	c	14[illegible]	1,[illegible]	~0	1.0	0	3[illegible]
[illegible]	1[illegible]	[illegible]	c	[illegible]	[illegible]	324	1.0	[illegible]	1[illegible]
[illegible]	1[illegible]	1	c	[illegible]	[illegible]	307	1.0	307	[illegible]
1,04?	10, 9.0	9[illegible], [illegible]		8.[illegible]	[illegible], [illegible]	2[illegible], 2[illegible]	1.0	2[illegible], [illegible]	[illegible]
1,100	6.2, 9.5	[illegible], [illegible]	c	5.[illegible]	17.[illegible], 18.7	167, 165	1.0	167, 165	11
1,177	[illegible]	[illegible]	c	[illegible]	10.6	114	1.0	114	[illegible]
[illegible]	3.3	[illegible]	c	2.[illegible]	9.3	[illegible]	1.0	9[illegible]	[illegible]
1,25?	[illegible]		c	[illegible]	[illegible]	77	[illegible]	77	[illegible]
[illegible]	[illegible]	[illegible]	c	[illegible]	3.9	5[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	c	0.[illegible]	[illegible]	37	[illegible]	[illegible]	1.4
[illegible]	[illegible]	[illegible]	c	[illegible]	[illegible]	[illegible]	1.0	[illegible]	[illegible]
[illegible]	0.9[illegible]	[illegible]	[illegible]	[illegible]	0.9[illegible]	1[illegible]	[illegible]	1[illegible]	<[illegible]
[illegible]	[illegible]		c	0.[illegible]	0.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0,[illegible]	[illegible]	c	[illegible]	0.1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[a][illegible]

[b][illegible]

[c][illegible]



(U)
Figure 3.50 (S-RD) Operation Teapot - Shot 10 (High-Altitude) - Partially corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.77 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 12 (MET)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
1,0[illegible]	a	548-0	4,900	2.73x10[illegible]	1.98x10[illegible]	4.27x10[illegible]	2.54x10[illegible]	31.7	476	b	54.0	561.7	4,240	1.0	4,240	122
1,10[illegible]	a	548-0	2,600	1.42x10[illegible]	7.64x10[illegible]	3.16x10[illegible]	1.37x10[illegible]	16.9	263	b	30.3	300.2	2,300	1.0	2,300	66
1,[illegible]	a	1290	670	1.89x10[illegible]	1.01x10[illegible]	4.72x10[illegible]	1.77x10[illegible]	3.86	6.68	b	3.84	13.38	657	1.0	657	8.7
1,[illegible]	a	1290	530	1.41x10[illegible]	7.49x10[illegible]	3.61x10[illegible]	1.30x10[illegible]	2.88	4.95	b	2.87	10.70	519	1.0	519	6.1
1,[illegible]	a	1290	440	1.06x10[illegible]	5.70x10[illegible]	2.69x10[illegible]	9.71x10[illegible]	2.36	3.77	b	2.14	8.07	432	1.0	432	4.7
1,[illegible]	a	606, 1290	300	8.06x10[illegible]	4.34x10[illegible]	2.05x10[illegible]	7.36x10[illegible]	1.83, 1.65	1.96, 2.88	b	1.64	5.43, 6.17	295, 294	1.0	295, 294	3.5
1,655	a	606, 1290	265	6.09x10[illegible]	3.28x10[illegible]	1.55x10[illegible]	5.55x10[illegible]	1.32, 1.24	1.47, 2.17	b	1.24	4.11, 4.65	261, 260	1.0	261, 260	2.7
1,705	a	606, 1290	226	4.57x10[illegible]	2.51x10[illegible]	1.19x10[illegible]	4.23x10[illegible]	1.04, 0.93	1.14, 1.65	b	0.93	3.11, 3.51	223, 222	1.0	223, 222	1.9
1,755	a	606, 1290	190	3.47x10[illegible]	1.92x10[illegible]	8.93x10[illegible]	3.15x10[illegible]	0.79, 0.71	0.87, 1.27	b	0.71	2.37, 2.69	188, 187	1.0	188, 187	1.3
1,805	a	606, 1290	161	2.64x10[illegible]	1.47x10[illegible]	6.81x10[illegible]	2.42x10[illegible]	0.60, 0.54	0.67, 0.97	b	0.54	1.81, 2.05	139, 139	1.0	139, 139	<1.3
1,855	a	606	123	2.01x10[illegible]	1.11x10[illegible]	5.23x10[illegible]	1.83x10[illegible]	0.46	0.50	b	0.41	1.37	122	1.0	121	<1.3
1,905	a	606	100	1.52x10[illegible]	8.54x10[illegible]	3.99x10[illegible]	1.38x10[illegible]	0.35	0.39	b	0.31	1.05	99	1.0	99	<1.3
1,955	a	606	86	1.15x10[illegible]	6.54x10[illegible]	3.06x10[illegible]	1.07x10[illegible]	0.26	0.30	b	0.24	0.80	85	1.0	85	<1.3
2,004	a	606	67	8.96x10[illegible]	5.10x10[illegible]	2.36x10[illegible]	8.21x10[illegible]	0.20	0.18	b	0.17	0.55	66	1.0	66	<1.3
2,096	a	606	49	5.47x10[illegible]	3.14x10[illegible]	1.46x10[illegible]	5.61x10[illegible]	0.12	0.11	b	0.10	0.33	49	1.0	49	<1.3
2,196	a	606	33	3.32x10[illegible]	1.87x10[illegible]	8.71x10[illegible]	2.97x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	33	1.0	33	<1.3
2,304	a	510	24	1.85x10[illegible]	1.07x10[illegible]	5.08x10[illegible]	1.66x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	24	1.0	24	<1.3
2,404	a	510	15	1.11x10[illegible]	6.40x10[illegible]	2.94x10[illegible]	9.86x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	15	1.0	15	<1.3
2,503	a	510	9.1	3.95x10[illegible]	2.36x10[illegible]	1.06x10[illegible]	3.54x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	9.1	1.0	9.1	<1.3
2,703	a	510	6.6	2.37x10[illegible]	1.44x10[illegible]	6.50x10[illegible]	2.16x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	6.6	1.0	6.6	<1.3
2,803	a	510	4.9	1.42x10[illegible]	8.65x10[illegible]	3.94x10[illegible]	2.30x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	4.9	1.0	4.9	<1.3
2,903	a	502	3.7	8.78x10[illegible]	5.34x10[illegible]	2.40x10[illegible]	7.83x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	3.7	1.0	3.7	<1.3
3,003	a	502	2.6	5.27x10[illegible]	3.33x10[illegible]	1.44x10[illegible]	4.77x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	2.6	1.0	2.6	<1.3
3,103	a	502	1.9	3.17x10[illegible]	2.02x10[illegible]	9.14x10[illegible]	2.91x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	1.9	1.0	1.9	<1.3
3,203	a	502	1.4	1.94x10[illegible]	1.24x10[illegible]	5.61x10[illegible]	1.77x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	1.4	1.0	1.4	<1.3
3,303	a	502	1.12	1.17x10[illegible]	7.89x10[illegible]	3.44x10[illegible]	1.07x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	1.12	1.0	1.12	<1.3
3,403	a	502	0.80	7.07x10[illegible]	4.83x10[illegible]	2.12x10[illegible]	6.47x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	0.80	1.0	0.80	<1.3
3,502	a	502	0.65	4.39x10[illegible]	3.01x10[illegible]	1.30x10[illegible]	3.94x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	0.65	1.0	0.65	<1.3
3,602	a	502	0.45	2.69x10[illegible]	1.85x10[illegible]	8.15x10[illegible]	2.42x10[illegible]	<0.12	<0.11	b	<0.10	<0.33	0.45	1.0	0.45	<1.3

[a] Unknown.
[b] [illegible] film holder attached to stakes.

(U) TABLE 3.78 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT 13 (APPLE II)

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux S	Shield Type
yd			r	n/cm²	n/cm²	
1,500	a	1290	840	b	b	c
1,600	a	1290	410	b	b	c
1,700	a	1290	320	b	b	c
1,800	a	1290, 606	200-180	b	b	c
1,900	a	1290, 606	135-110	b	b	c
2,000	a	1290, 606	99-82	b	b	c
2,100	a	1290, 606	63-52	b	b	c
2,200	a	1290, 606	46-38	b	b	c
2,300	a	1290, 606	33-25	b	b	c
2,400	a	1290, 606, 510	20-19-18	b	b	c
2,500	a	510	11	b	b	c
2,600	a	510	11	b	b	c
2,700	a	510	6.4	b	b	c
2,800	a	502, 510	[illegible]	b	b	c
2,900	a	502, 510	[illegible]	b	b	c
3,000	a	502, 510	4.0-[illegible]	b	b	c
3,200	a	502	2.1	b	b	c
3,400	a	502	1.7	b	b	c

[a] Unknown.
[b] Not taken.
[c] [illegible] film holder attached to [illegible] stakes.

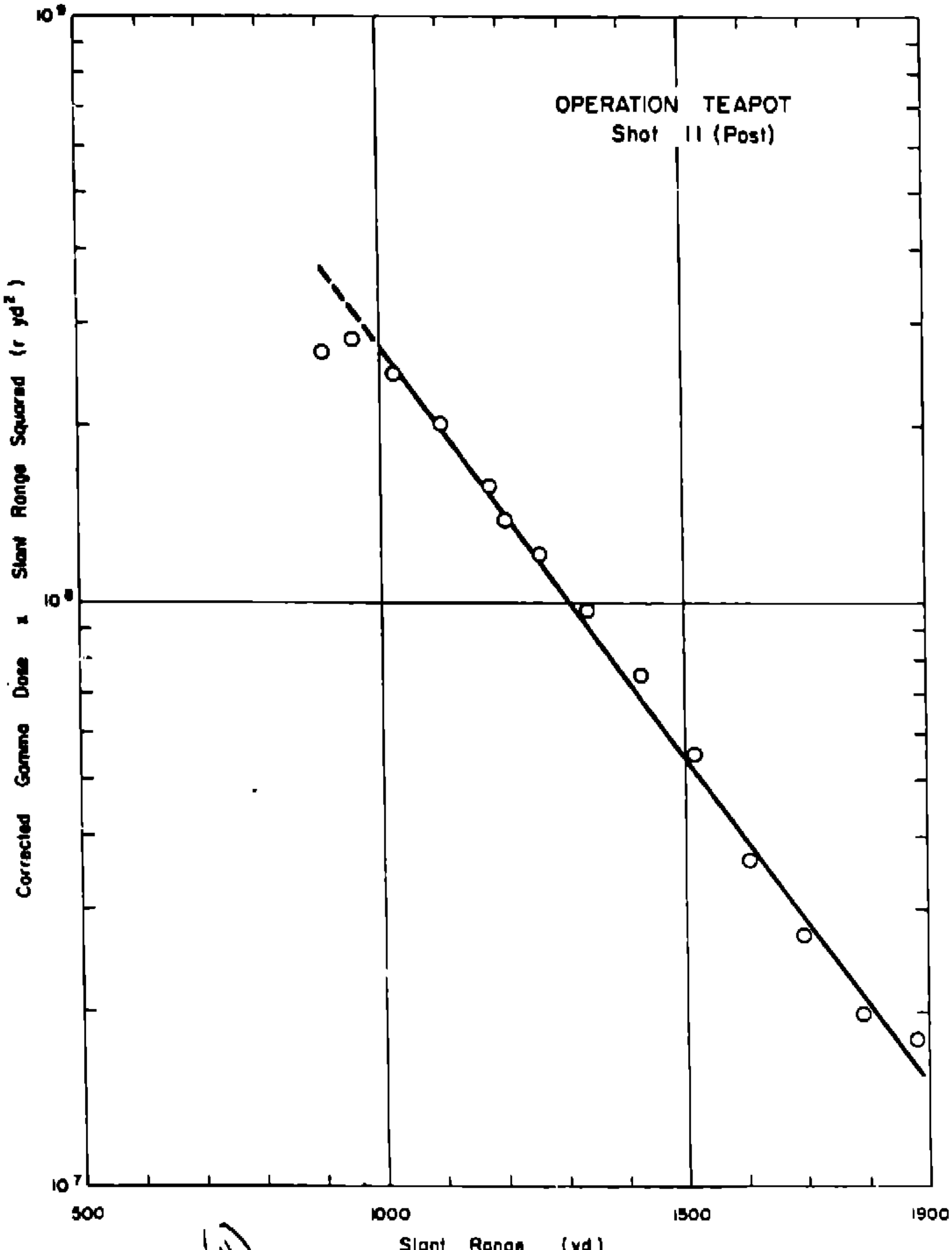


Figure 3.51 (S-RD). Operation Teapot - Shot 11 (Post) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

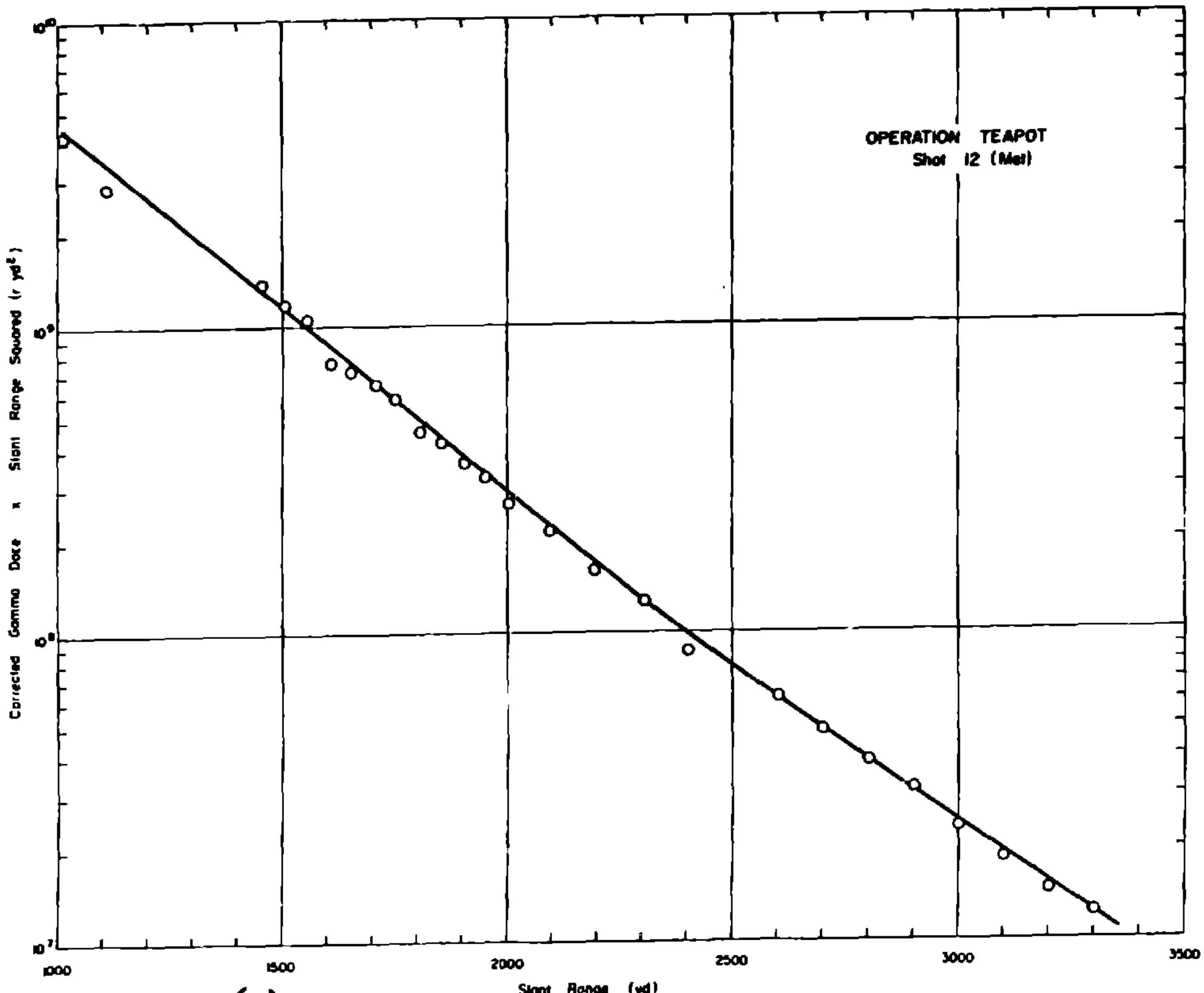


Figure 3.52 ~~(S-RD)~~ (U) Operation Teapot - Shot 12 (Met) - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

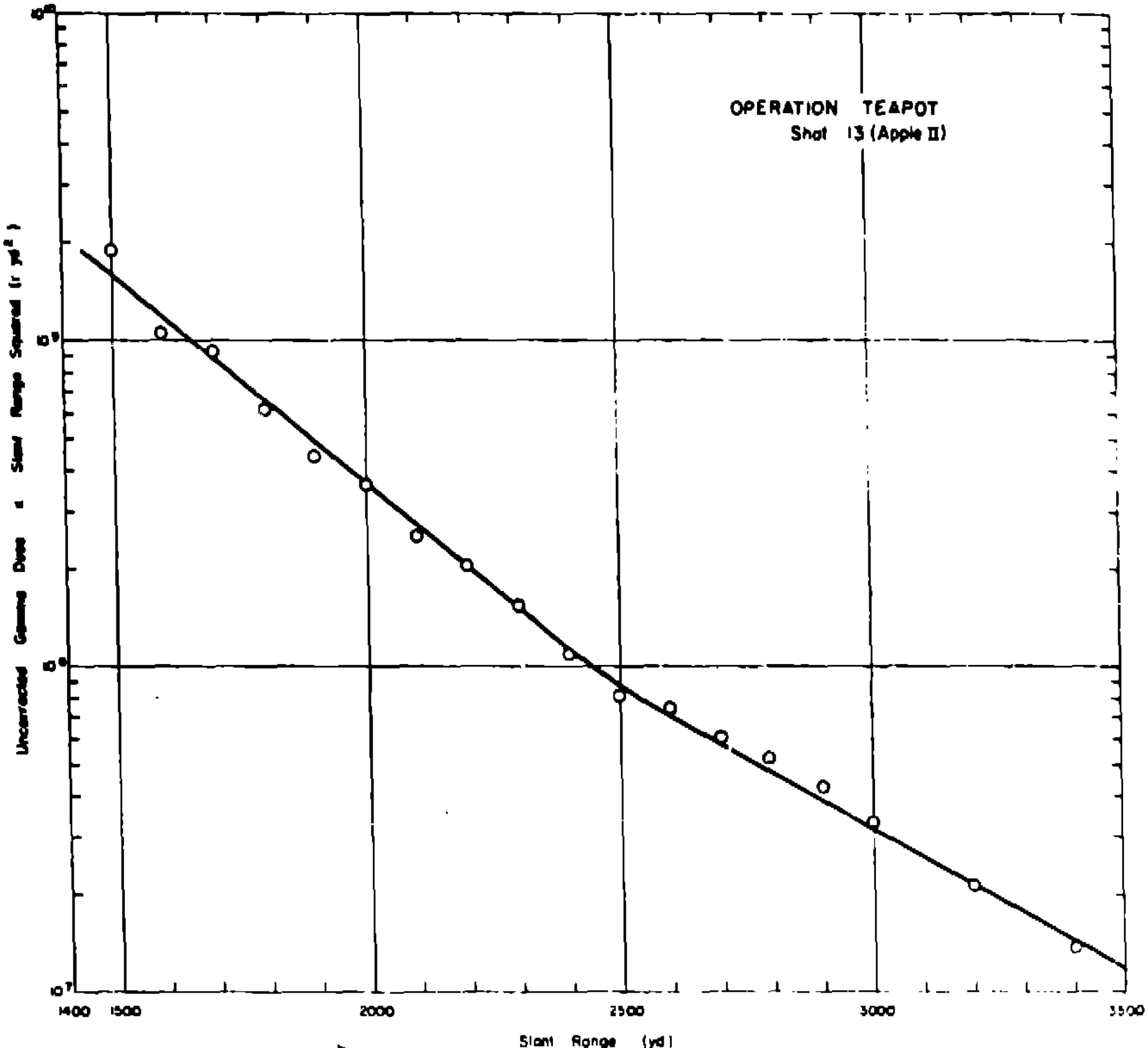


Figure 3.53 (U) ~~(S-RD)~~ Operation Teapot - Shot 13 (Apple II) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) (S-RD) TABLE 3.79 INITIAL GAMMA DOSE DATA - OPERATION TEAPOT, SHOT ZUCHINNI

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux (Au Pu Np U S)	Shield Type
yd			r		
1,500	a	1290	530	b	c
1,600	a	1290	350	b	c
1,700	a	1290	230	b	c
1,800	a	1290, 606	150, 130	b	c
1,900	a	1290, 606	90, 77	b	c
2,000	a	1290, 606	63, 55	b	c
2,100	a	1290, 606	42, 38	b	c
2,200	a	1290, 606	30, 27	b	c
2,300	a	1290, 606	22, 20	b	c
2,400	a	510	13.5	b	c
2,500	a	510	11	b	c
2,600	a	510, 502	8.4, 8.0	b	c
2,700	a	510, 502	6.3, 6.0	b	c
2,800	a	510, 502	4.7, 4.4	b	c
2,900	a	510, 502	3.5, 3.1	b	c
3,000	a	510, 502	2.6, 2.3	b	c
3,200	a	502	1.45	b	c
3,400	a	502	0.78	b	c

[a] Unknown.
[b] No neutron data.
[c] NBS film holder attached to angle-iron stake.

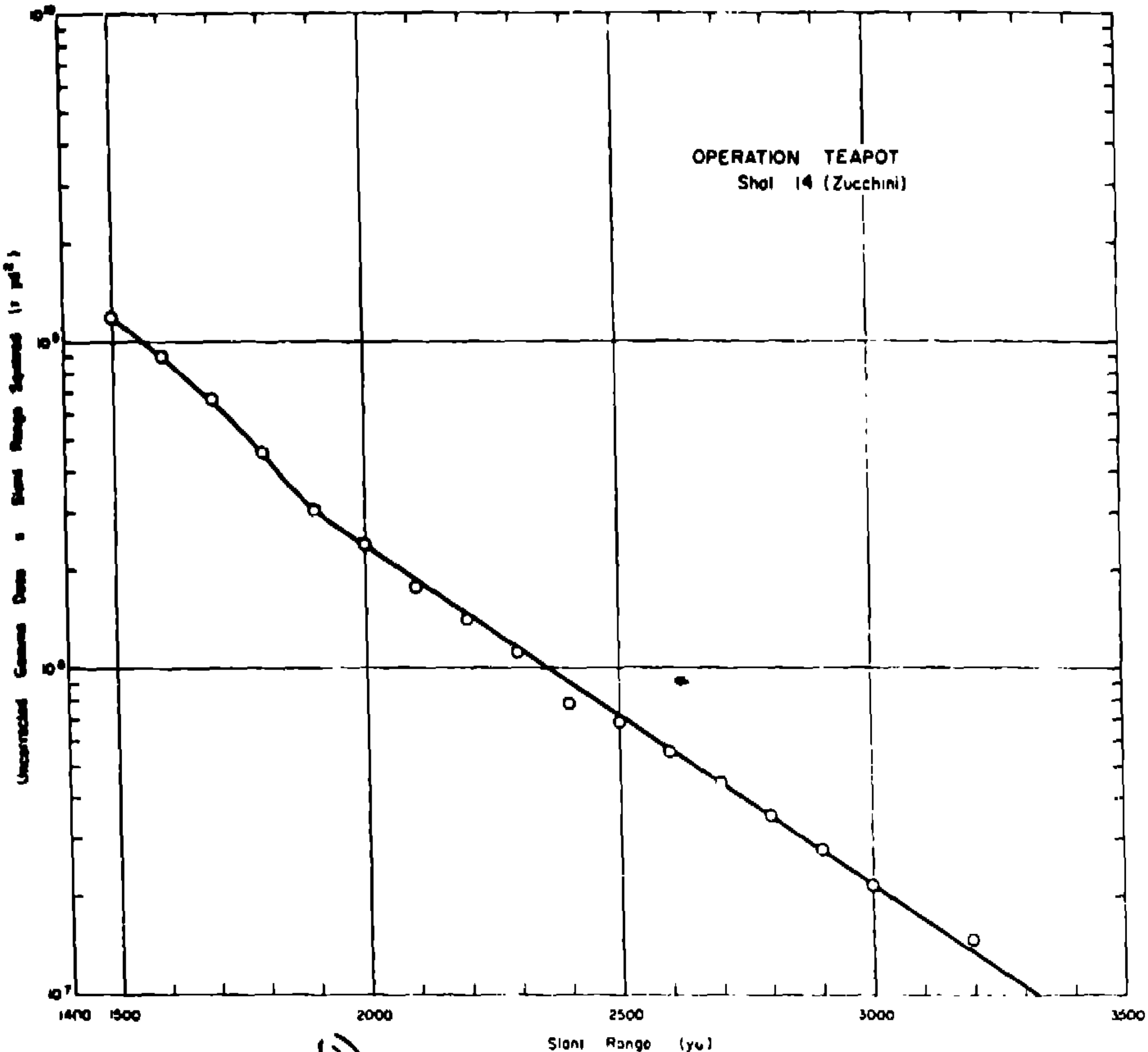


Figure 3.54 ~~(S-RD)~~ Operation Teapot - Shot 14 (Zucchini) - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.80 SHOT INFORMATION - OPERATION REDWING

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total
			ft	kt
Zuni	27 May 1956 1756:00 GMT	Eninman (Tare) Surface	9	3.5x10[3]
Yuma	27 May 1956 1956:01 GMT	Sally-Tower	200	
Erie	30 May 1956 1815:29 GMT	Yvonne-Tower	300	
Blackfoot	11 June 1956 1826:00 GMT	Yvonne-Tower	200	
Flathead	11 June 1956 1826:00 GMT	Off Yurochi (Dog) Barge	5	
Kickapoo	13 June 1956 2326:01 GMT	Sally-Tower	300	
Dakota	25 June 1956 1806:00 GMT	Off Yurochi (Dog) Barge	Surface	
Navajo	10 July 1956 1756:00 GMT	Off Yurochi (Dog) Barge	15	
Tewa	20 July 1956 1746:00 GMT	Between Yurochi (Dog) and Yomm (Charlie) Barge	15	4.6x10[3]

(U) TABLE 3.81 METEOROLOGICAL DATA - OPERATION REDWING

Shot	Pressure	Temperature	Density	ρ/ρ_0	$(\rho_0/\rho)^{1/3}$
	mb	°K	g/cm³ x10⁻³		
Zuni	[illegible]	[illegible]	[illegible]	0.91	[illegible]
Yuma	[illegible]	[illegible]	1.17	0.90	[illegible]
Erie	1,009.1	[illegible]	1.18	0.91	[illegible]
Blackfoot	1,012.5	[illegible]	1.18	0.91	1.21
Flathead	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kickapoo	1,010	[illegible]	[illegible]	[illegible]	[illegible]
Dakota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Navajo	1,010	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(U)

(SRD) TABLE 3.83 INITIAL GAMMA DOSE DATA - OPERATION REDWING, SHOT ZUNI

Slant Range	Station	Location	Film Type	Total Exposure	Residual + Preshot Exposure	Corrected Exposure	Attenuation Shielding Factor
yd				r	r	r	
2,333	210.30	Roger	548	16,000	150	15,850	1.10
[illegible]	210.29	Uncle Reef	606	2,500	15	2,485	1.10
3,140	210.33	Uncle Reef	606	1,080	15	1,785	1.10
3,140	210.33	Uncle Reef	Chem Dos	850	15	835	1.10
3,433	210.34	Uncle	606	465	150	315	1.10
3,645	210.35	Uncle Reef	606	205	15	190	1.10
3,757	210.27	Peter	606	200	150	50	1.10
3,837	210.56	Peter Reef	606	69	15	54	1.10
4,313	210.26	Peter Reef	510	25	15	10	1.10

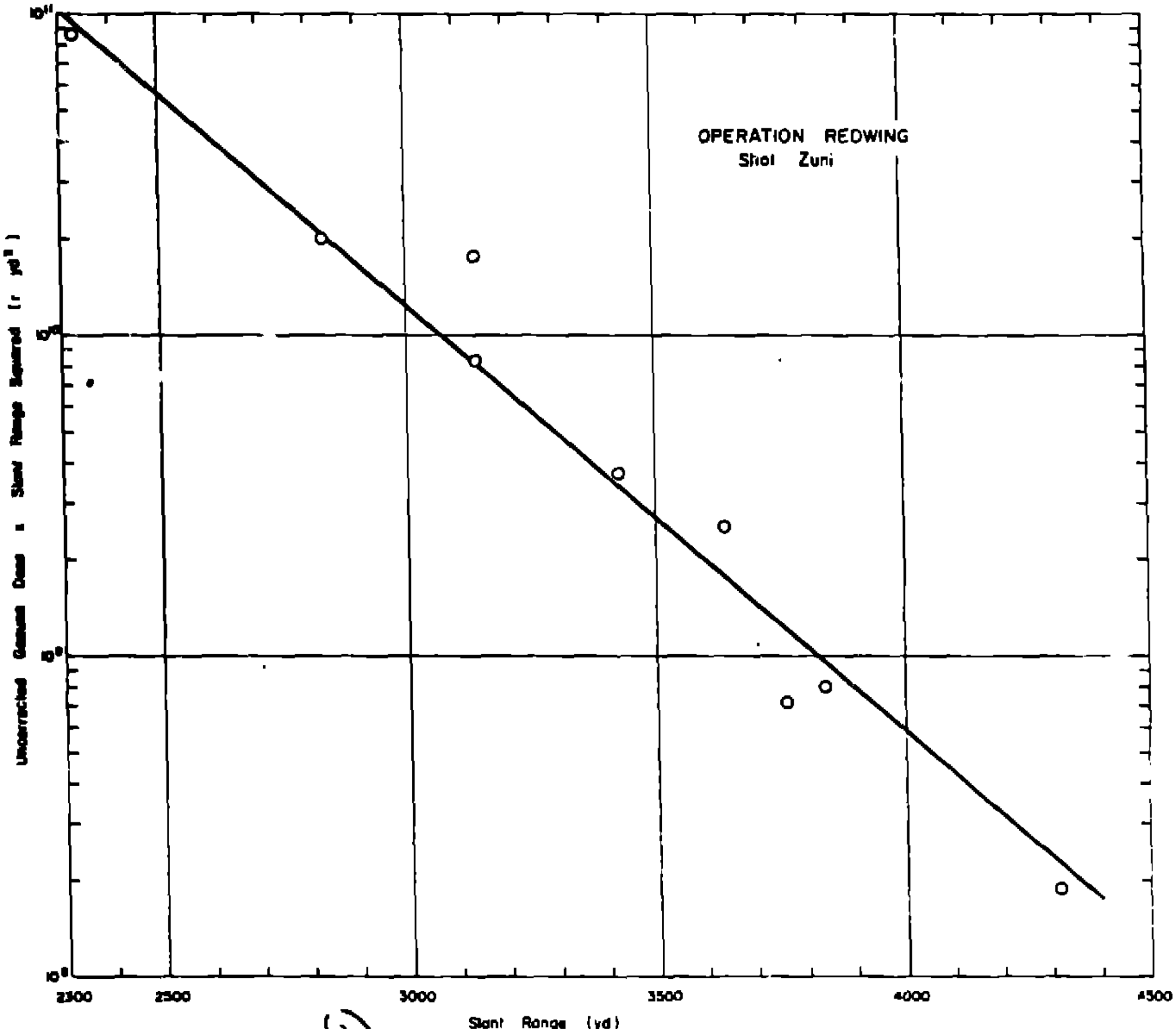


Figure 3.56 (U) ~~(S-RD)~~ Operation Redwing - Shot Zuni - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

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(U)

~~(S-RD)~~ TABLE 3.90 INITIAL GAMMA DOSE DATA - OPERATION REDWING, SHOT TEWA

Slant Range	Station	Location	Film Type	Total Exposure	Residual + Preshot Exposure	Corrected Exposure	Attenuation Shielding Factor
yd				r	r	r	
958	113.07	NM No. 1	548	> 7x10^4	800	> 7x10^4	1.20
1,980	113.08	NM No. 2	548	> 7x10^4	800	> 7x10^4	1.20
2,253	113.06	Charlie-Dog Reef	548-Chem	7x10^4 - 3.35x10^5	250	3.35x10^5	1.21
3,500	113.03	Charlie-Dog Reef	548	3,300	250	3,075	1.20
3,610	113.04	NM No. 3	606	1,950	800	1,150	1.20

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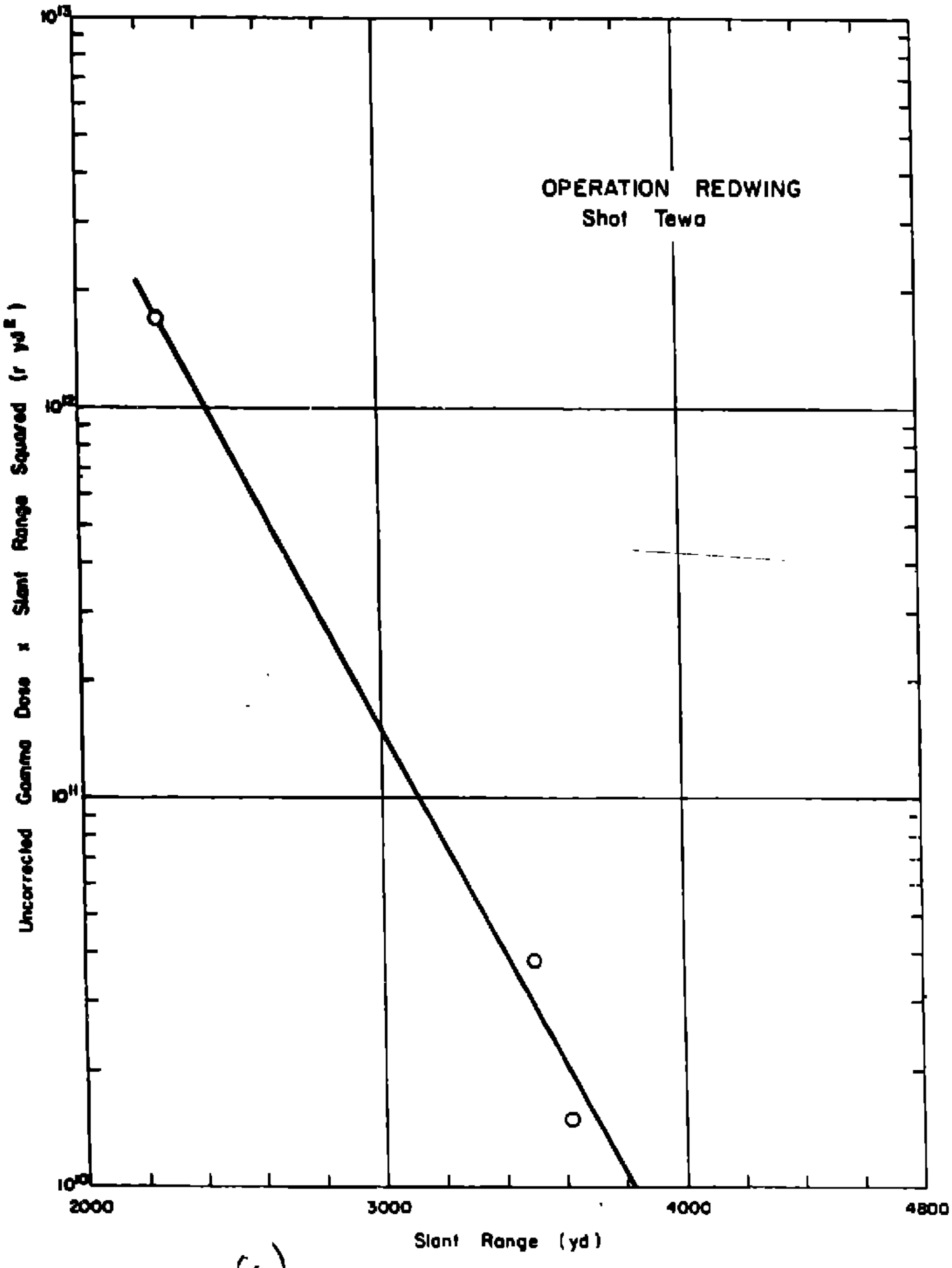


Figure 3.63 (U) Operation Redwing - Shot Tewa - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

(U) [illegible] SHOT INFORMATION - OPERATION PLUMBBOB

Test Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total
			ft	kt
Boltzmann	28 [illegible] 1957 11:55:00 GMT	Area 7-C Tower	500	[illegible]
Franklin	[illegible] June 1957 [illegible] GMT	Area [illegible]	300	0.14
Wilson	18 June 1957 [illegible] GMT	Area [illegible] Balloon	500	10.3
Priscilla	24 June 1957 13:30:00 GMT	F.F.-Balloon	700	36.6
H[illegible]	5 July 1957 11:40:00 GMT	[illegible] B-[illegible]-Balloon	1500	71
Diablo	15 July 1957 11:30:00 GMT	Area [illegible]-Tower	500	17
Kepler	24 July 1957 11:50:00 GMT	Area 4-Tower	500	10.1
Owens	25 July 1957 13:30:00 GMT	Area 9-[illegible]-Balloon	500	9.7
Stokes	7 Aug 1957 12:25:00 GMT	Area B-[illegible]-Balloon	1500	19
Shasta	18 Aug 1957 12:00:00 GMT	Area 2-Tower	500	16.5
Doppler	23 Aug 1957 12:30:00	Area 7-Balloon	1500	10.7
Franklin Prime	30 Aug 1957 12:40:00 GMT	Area 7[illegible] Balloon	[illegible]	[illegible]
Smoky	31 Aug 1957 12:30:00 GMT	Area [illegible]-Tower	700	44
Galileo	[illegible]	Area 1 Tower	500	11.5
Laplace	[illegible]	Area [illegible]		
Fizeau	[illegible]	Area [illegible]-Tower	[illegible]	[illegible]
Whitney	[illegible]	Area [illegible]-Tower	[illegible]	[illegible]
[illegible]	[illegible]	Area [illegible]-Balloon	[illegible]	11 [illegible]

(U) TABLE 3.9 METEOROLOGICAL DATA - OPERATION PLUMBBOB

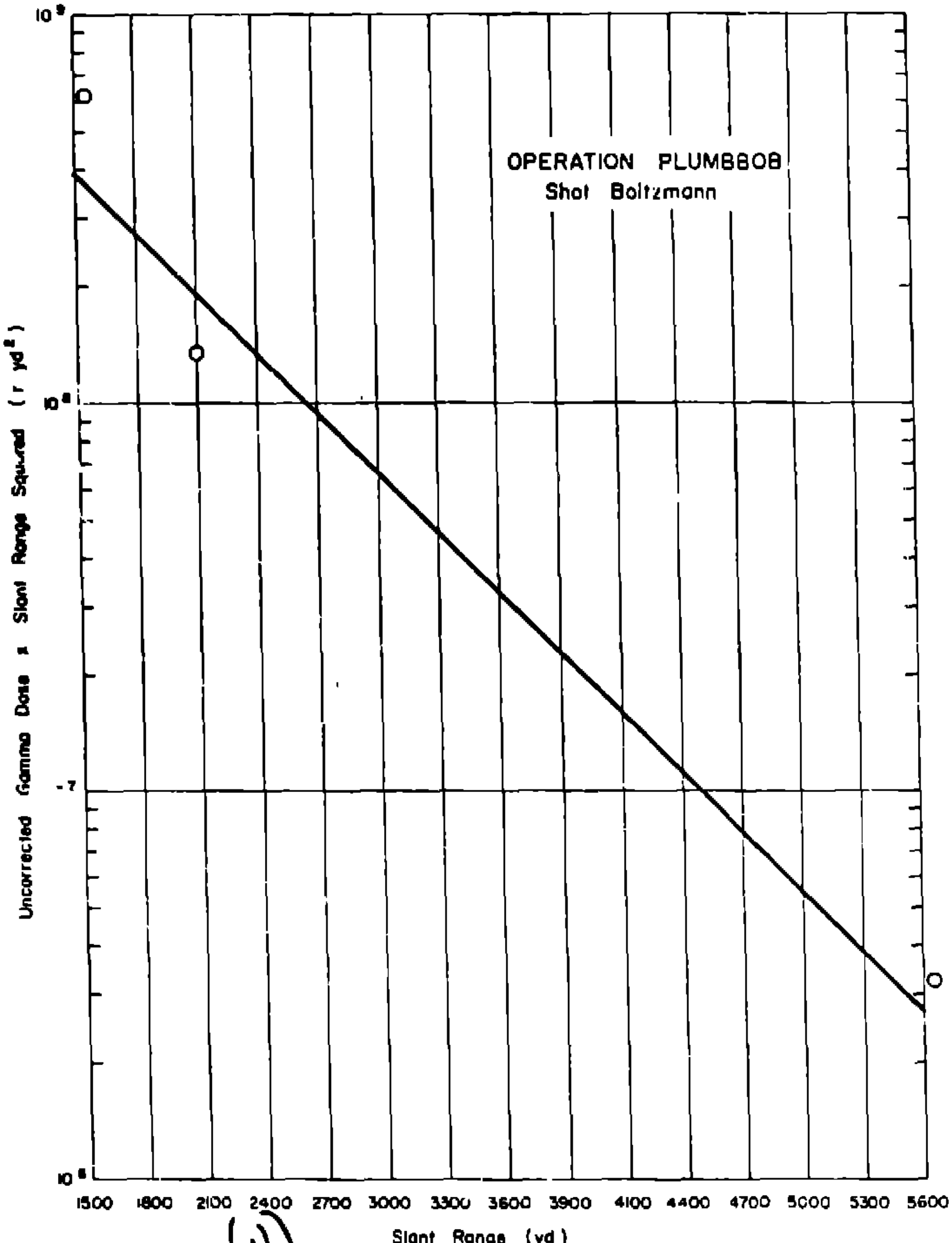
Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^2$
	mb	°K	g/cm³ x10³		
Boltzmann	879[a] 855[b]	286.5[a] 294.3[b]	1.07	0.81	1.53
Franklin	861[a] [illegible]	284.6[a] 293.5[b]	1.06	0.82	1.49
Wilson	[illegible] [illegible]	285[a] 293.3[b]	1.06	0.82	1.49
Priscilla	[illegible][a] [illegible][b]	290.5[a] 297[b]	1.06	0.82	1.49
Hood	[illegible] [illegible]	297[a] 299.9[b]	1.01	0.78	1.64
Diablo	[illegible][a] 849[b]	286.8[a] 296.8[b]	1.04	0.80	1.56
Kepler	[illegible] [illegible]	282.5[a] 294.2[b]	[illegible]	0.81	1.53
Owens	[illegible][a] [illegible][b]	288.5[a] 296.1[b]	1.04	0.80	1.56
Stokes	860[a] [illegible][b]	282.1[a] 286.8[b]	1.04	0.80	1.56
Shasta	[illegible][a] [illegible][b]	290.2[a] 299.5[b]	1.03	0.79	1.60
Doppler	[illegible][a] [illegible][b]	292[a] 295[b]	1.03	0.79	1.60
Franklin Prime	[illegible] [illegible]	281.2[a] 267.3[b]	1.06	0.82	1.49
Smoky	[illegible][a] [illegible][b]	277.2[a] 266.2[b]	1.08	0.83	1.45
Galileo	[illegible][a] [illegible][b]	281.5[a] 291.8[b]	1.05	0.81	1.53
Laplace	[illegible][a] [illegible][b]	286.5[a] 298.4[b]	1.04	0.80	1.56
Fizeau	[illegible] [illegible]	298.6[a] 295[b]	1.04	0.80	1.56
Whitney	[illegible] [illegible]	277.5[a] 290[b]	1.08	0.83	1.45
Charleston	[illegible] [illegible]	287[a] 284.9[b]	1.05	0.81	1.53

[a]Ground condition.
[b]Burst height condition.

(S-RD) TABLE 3.93 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT BOLTZMAN

Slant Range	Azimuth	Type Detector	Uncorrected Gamma Dose	Neutron Flux					Shield Type
				Au	Pu	Np	U	S	
yd			r			n/cm²			
1,576	163°42'49.5"	Film 606	248.0			a			½ Emmett
2,109	163°42'49.5"	Film 510, 606	28.5-33.0			a			Emmett
5,711	-	Film 502	0.10			a			Franklin Shot Tower

[a] Insufficient neutron data to extrapolate to the slant ranges of interest.



(U)

Figure 3.64 ~~(S-RD)~~ Operation Plumbbob - Shot Boltzmann - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE [illegible] INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT [illegible]

Slant Range	Azimuth	Dosimeter Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
510	a	c	540	$1.08x10^{11}$	$4.23x10^{11}$	$2.62x10^{11}$	$5.96x10^{10}$
649	a	c	400	$5.39x10^{10}$	$1.91x10^{11}$	$1.30x10^{11}$	$2.91x10^{10}$
806	a	c	80	$1.51x10^{10}$	$5.23x10^{10}$	$3.69x10^{10}$	$8.26x10^{9}$
[illegible]	a	c	58	[illegible]	$2.93x10^{10}$	$2.05x10^{10}$	$4.58x10^{9}$
1,0[illegible]	a	c	25	[illegible]	$1.66x10^{10}$	$1.20x10^{10}$	$2.60x10^{9}$
1,104	a	c	12	$2.79x10^{9}$	$1.07x10^{10}$	$6.96x10^{9}$	$1.50x10^{9}$
727	b	c	178	[illegible]	$8.71x10^{10}$	[illegible]	$1.33x10^{10}$
816	b	c	70	$1.42x10^{10}$	$5.00x10^{10}$	$3.50x10^{10}$	$7.89x10^{9}$
930	b	c	31	$7.33x10^{9}$	$2.54x10^{10}$	$1.81x10^{10}$	$3.96x10^{9}$
1,127	b	c	20	$2.48x10^{9}$	$8.03x10^{9}$	$6.14x10^{9}$	$1.30x10^{9}$

Slant Range	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma	Attenuation Factor	Final Corrected Gamma	Soil Contribution
yd	r	r		r	r	r		r	r
510	d	d	e	3.3	3.3	537	1.05	564	42.7
649	d	d	e	1.7	1.7	394	1.05	419	19.5
806	d	d	e	<1	<1	80	1.05	84	5.07
[illegible]	d	d	e	<1	<1	58	1.05	61	3.00
1,0[illegible]	d	d	e	<1	<1	[illegible]	[illegible]	[illegible]	[illegible]
1,104	d	d	e	<1	<1	[illegible]	[illegible]	[illegible]	[illegible]
727	d	d	e			177	1.05	186	8.45
816	d	d	e	[illegible]	<1	70	[illegible]	74	4.68
930	d	d	e	<1	<1	31	[illegible]	33	2.47
1,127	d	d	e	<1	<1	20	1.04	21	0.75

[a] [illegible]
[b] [illegible]
[c] Chemical.
[d] Negligible.
[e] ORNL Beer Mug w/Li.

(U) TABLE 1.95 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT WILSON

Slant Range	Azimuth	Dosimeter Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
527	16°[illegible]	Film 548	52,[illegible]	$1.9x10^{13}$	$4.42x10^{13}$	$2.90x10^{13}$	$7.30x10^{12}$
1,[illegible]	16°[illegible]	Film 606	3,450.0	$5.4x10^{11}$	$1.57x10^{12}$	$7.1x10^{11}$	$3.6x10^{11}$
1,[illegible]	16°[illegible]	Film 606	2,8[illegible].0	$5.4x10^{11}$	$1.57x10^{12}$	$7.1x10^{11}$	[illegible]
1,[illegible]	16°[illegible]	Film 606	[illegible].0	$1.1x10^{11}$	$4.33x10^{11}$	[illegible]	$8.8x10^{10}$
1,[illegible]	16°[illegible]	Film 606	2[illegible].0	$3.5x10^{10}$	$1.18x10^{11}$	$5.4x10^{10}$	$2.55x10^{10}$
[illegible]	16°[illegible]	Film 606	2[illegible].0	$3.5x10^{10}$	$1.18x10^{11}$	$5.4x10^{10}$	$2.55x10^{10}$
[illegible]	16°[illegible]	Film 606	[illegible].0	$9.1x10^{9}$	$3.76x10^{10}$	$1.42x10^{10}$	$8.73x10^{9}$
2,[illegible]	16°[illegible]	[illegible]	[illegible].0	$2.4x10^{9}$	$8.6x10^{9}$	[illegible]	$2.28x10^{9}$
[illegible]	16°[illegible]	[illegible]	[illegible]	$2.3x10^{9}$	$8.6x10^{9}$	[illegible]	[illegible]
[illegible]	16°[illegible]	50 - 10	[illegible]	$6.7x10^{8}$	$4.85x10^{9}$	$3.19x10^{8}$	$7.48x10^{8}$
[illegible]	16°[illegible]	[illegible]	[illegible].02	[illegible]	$7.97x10^{8}$	$2.27x10^{8}$	$2.47x10^{8}$
[illegible]	16°[illegible]	[illegible]	[illegible].02	[illegible]	$7.97x10^{8}$	[illegible]	$2.47x10^{8}$
2,[illegible]	16°[illegible]	50 - 10	4.1-[illegible]	$<10x10^{8}$	[illegible]	$<10x10^{8}$	$<10x10^{8}$
[illegible]	16°[illegible]	[illegible]	[illegible].50	$<10x10^{8}$	$<10x10^{8}$	$<10x10^{8}$	$<10x10^{8}$
3,004	16°[illegible]	50[illegible]	[illegible]	$<10x10^{8}$	$<10x10^{8}$	$<10x10^{8}$	$<10x10^{8}$
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$4.42x10^{4}$	[illegible]	$7.30x10^{4}$
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$1.80x10^{3}$	[illegible]	$3.47x10^{3}$
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$1.50x10^{3}$
1,015	120°	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
[illegible]	120°	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	117		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	45	[illegible]	[illegible]	[illegible]	[illegible]

Slant Range	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma	Attenuation Factor	Final Corrected Gamma	Soil Contribution
yd	r	r		r	r		r	r	r
527	[illegible]	15,200	-	6,[illegible]	23,400	[illegible]	1.23	35,200	6,060
1,[illegible]	123	107	c	[illegible]	[illegible]	[illegible]	1.23	3,750	170
1,[illegible]	123	107	c	[illegible]	310.4	[illegible]	1.0	2,504	170
1,[illegible]	31.8	23.1	d	[illegible]	81.5	[illegible]	1.0	[illegible]	43.2
1,[illegible]	8.00	0.40	c	[illegible]	25.70	[illegible]	[illegible]	[illegible]	11.4
[illegible]	8.00	6.40	[illegible]	5.00	20.0	[illegible]	1.0	[illegible]	11.4
[illegible]	2.10	1.90	[illegible]	1.73	[illegible]	90.3	1.0	[illegible]	[illegible]
2,[illegible]	0.50-0.52	0.77-0.53	c	0.74	[illegible]	[illegible]	1.16	[illegible]	[illegible]
[illegible]	0.50-0.52	0.72-0.53	e	0.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.17-0.15	0.07-0.33	d	0.13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0.05	0.02	e	[illegible]	[illegible]	[illegible]	[illegible]	8.00	[illegible]
[illegible]	0.05-0.04	[illegible]	e	0.030	0.10-0.16	[illegible]	1.0	[illegible]	[illegible]
2,[illegible]	<0.05	<0.07	f	[illegible]	<0.14	[illegible]	[illegible]	4.1-3.3	[illegible]
[illegible]	<0.05	<0.07	e	[illegible]	<0.14	[illegible]	[illegible]	1.71	[illegible]
3,004	<0.05	<0.07	e	<0.03	<0.14	[illegible]	[illegible]	1.36	[illegible]
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.05	37,800	6,[illegible]
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.05	[illegible]	2,210
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.05	[illegible]	1,020
1,015	b	b	f	[illegible]	[illegible]	[illegible]	1.05	[illegible]	170
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	[illegible]	110
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	[illegible]	[illegible]
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	910	[illegible]
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	[illegible]	[illegible]
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	415	21.2
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	270	11.3
[illegible]	b	b	f	[illegible]	[illegible]	117	1.04	122	3.00
[illegible]	b	b	f	[illegible]	[illegible]	[illegible]	1.04	47	<1.00

[illegible]

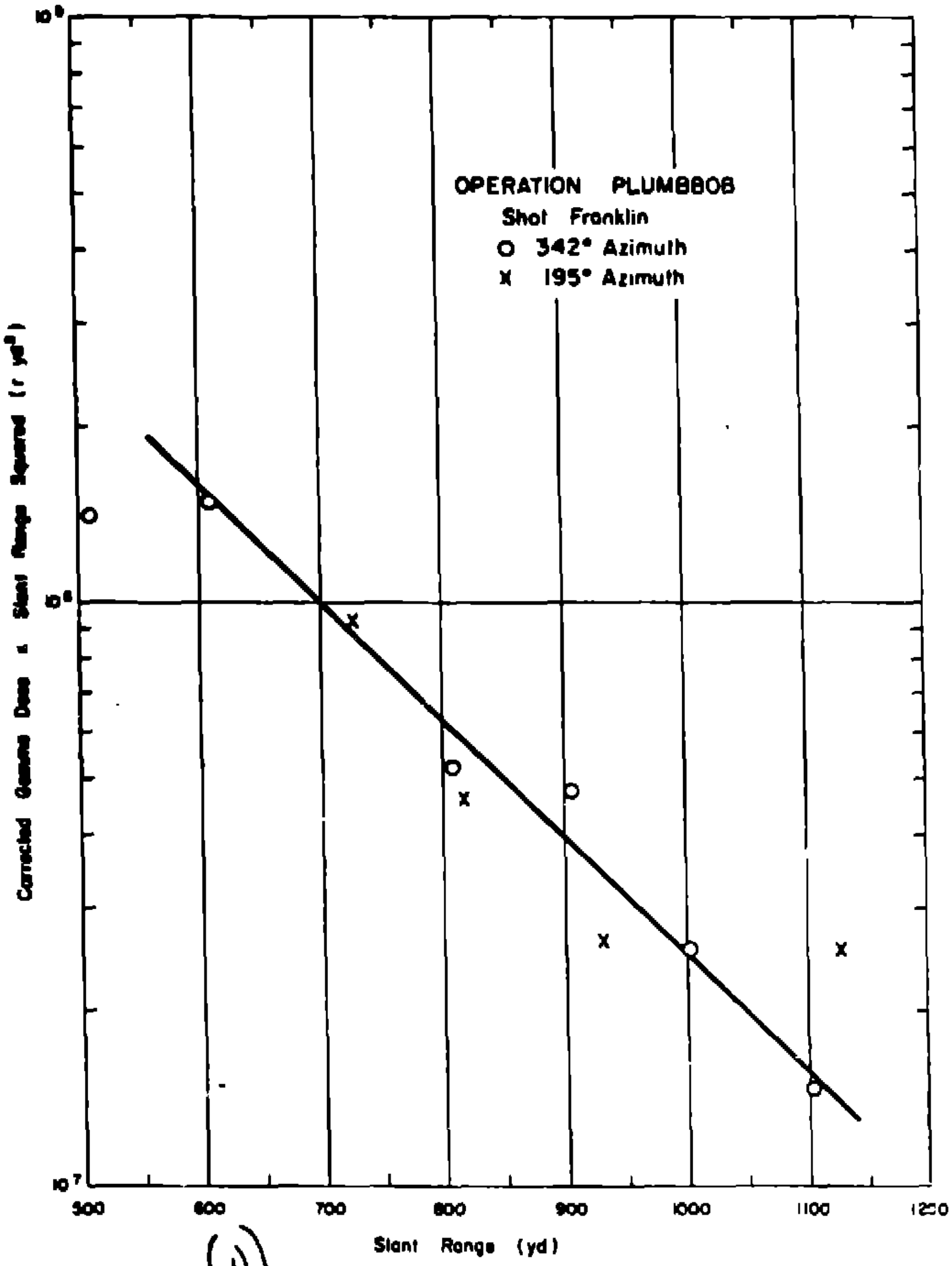


Figure 3.65 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Franklin - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

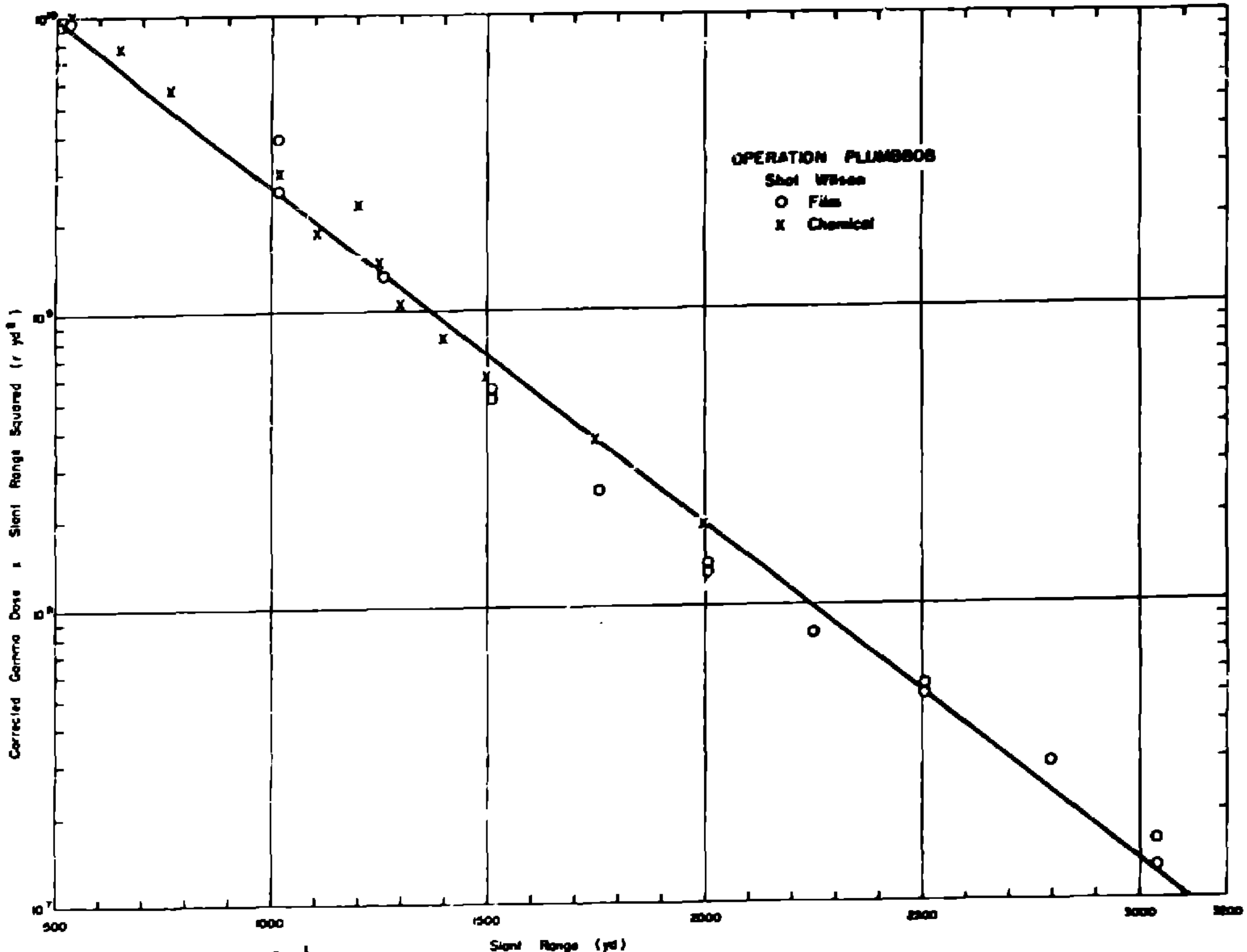


Figure 3.66 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Wilson - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE [illegible] INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT PRISCILLA

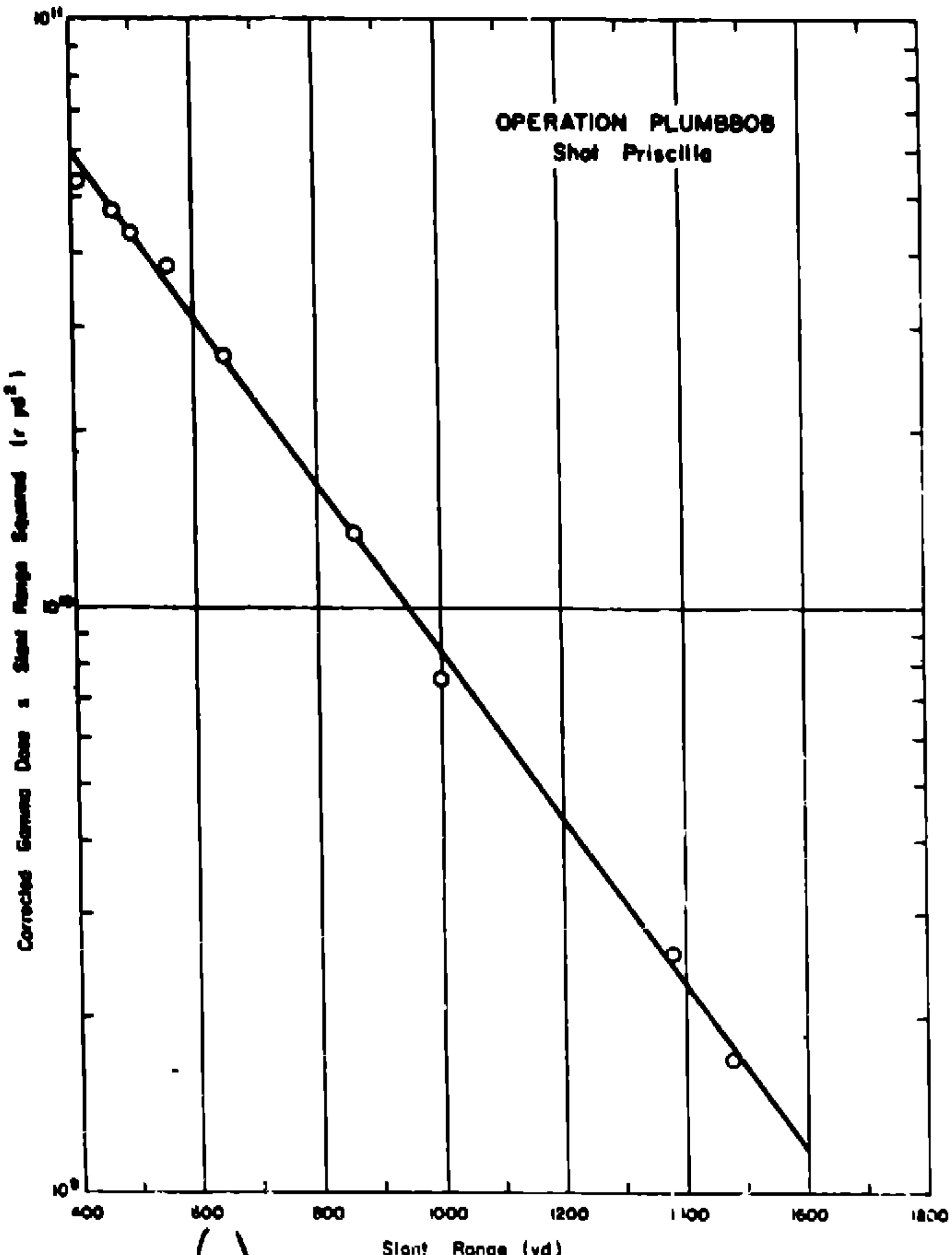
Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
410	a	b	300,000	3.19×10^{13}	1.33×10^{14}	[illegible]	2.17×10^{14}	c	c	d	909	909	299,000	1.05	314,000	16,700
470	a	b	205,000	2.04×10^{13}	7.69×10^{13}	5.65×10^{13}	1.86×10^{14}	c	c	d	581	581	204,000	1.05	214,000	10,500
500	a	b	165,000	1.54×10^{13}	6.08×10^{13}	4.04×10^{13}	7.76×10^{13}	c	c	d	437	437	165,000	1.05	173,000	7,950
560	a	b	115,000	9.87×10^{12}	4.24×10^{13}	2.53×10^{13}	6.37×10^{13}	c	c	d	281	281	115,000	1.05	121,000	5,250
650	a	b	60,000	5.25×10^{12}	1.76×10^{13}	1.22×10^{13}	3.25×10^{13}	c	c	d	150	150	59,800	1.05	62,800	2,640
760	a	b	17,000	1.39×10^{12}	4.9×10^{12}	2.47×10^{12}	9.11×10^{12}	c	c	d	39.0	39.0	17,000	1.05	17,900	769
1,000	a	b	7,200	6.00×10^{11}	1.65×10^{12}	[illegible]	3.94×10^{12}	c	c	d	17.0	17.0	7,180	1.05	7,540	<13
1,383	a	b	1,290	6.81×10^{10}	2.30×10^{11}	[illegible]	3.67×10^{11}	c	c	d	1.90	1.90	1,290	1.04	1,340	23.6
1,477	a	b	740	4.27×10^{10}	1.42×10^{11}	6.65×10^{10}	2.38×10^{11}	c	c	d	1.10	1.10	739	1.04	769	14.3
1,773	a	b	[illegible]	9.08×10^{9}	[illegible]	[illegible]	[illegible]	c	c	d	0.250	0.250	163	1.04	169	< 5

a 270°.
b Chemical.
c Negligible.
d GAGE Bear Bay with lithium.

(U) TABLE 3.97 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT HOOD

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
707	a	Film 545	>70,000	3.0×10^{13}	1.0×10^{14}	4.86×10^{14}	2.0×10^{14}	1,410	34,500	d	10,300	45,210	>22,000	1.23	>27,000	16,000
1,119	a	Film 548	17,500	3.59×10^{12}	1.06×10^{13}	5.19×10^{12}	2.54×10^{13}	406	3,590	d	1,230	5,225	12,300	1.14	14,000	1,450
1,500	a	Film [illegible]	[illegible]	3.86×10^{11}	1.12×10^{12}	5.20×10^{11}	2.54×10^{12}	86.4	51.4	d	61.4	199.2	1,800	1.14	2,050	115
2,000	a	Film [illegible]	305.0	4.01×10^{10}	[illegible]	7.07×10^{10}	2.96×10^{11}	9.10	6.60	d	13.6	29.7	276	1.14	315	12.[illegible]
2,542	a	Film [illegible]	66.7	4.93×10^{9}	[illegible]	[illegible]	[illegible]	1.10	0.77	d	1.70	3.57	61.1	1.14	69.7	1.57
3,071	a	Film 510	11.7	5.27×10^{8}	1.45×10^{9}	[illegible]	[illegible]	0.11	0.11	d	0.16	0.40	11.3	1.07	12.1	<1
3,513	a	[illegible]	[illegible]	5.95×10^{7}	1.57×10^{8}	9.86×10^{7}	2.53×10^{8}	< 0.1	< 0.1	d	< 0.1	< 0.1	3.31	1.07	3.54	<1
[illegible]	b	f	[illegible]	3.1×10^{13}	[illegible]	[illegible]	[illegible]	c	c	c	[illegible]	306	50,300	1.05	52,800	4,010
1,11[illegible]	b	f	17,600	3.59×10^{12}	1.06×10^{13}	5.19×10^{12}	2.54×10^{13}	c	c	c	111	111	17,500	1.04	18,200	1,440
[illegible]	b	f	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c	c	c	40.1	40.1	6,300	[illegible]	[illegible]	400
[illegible]	b	f	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c			14.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	b	f	740	[illegible]	[illegible]	[illegible]	[illegible]	c	c	c	4.8	4.05	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	b	f	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c	c	c	[illegible]	[illegible]	349	[illegible]	[illegible]	[illegible]
[illegible]	b	f	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c	c		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	b		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		c	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	b	f	140	[illegible]	[illegible]	[illegible]	[illegible]	c	c	c	[illegible]	[illegible]	140	[illegible]	[illegible]	3

a [illegible]
b [illegible]
c Negligible.
d [illegible]
[illegible]



(U)

Figure 3.67 ~~(C-RD)~~ Operation Plumbbob - Shot Priscilla - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

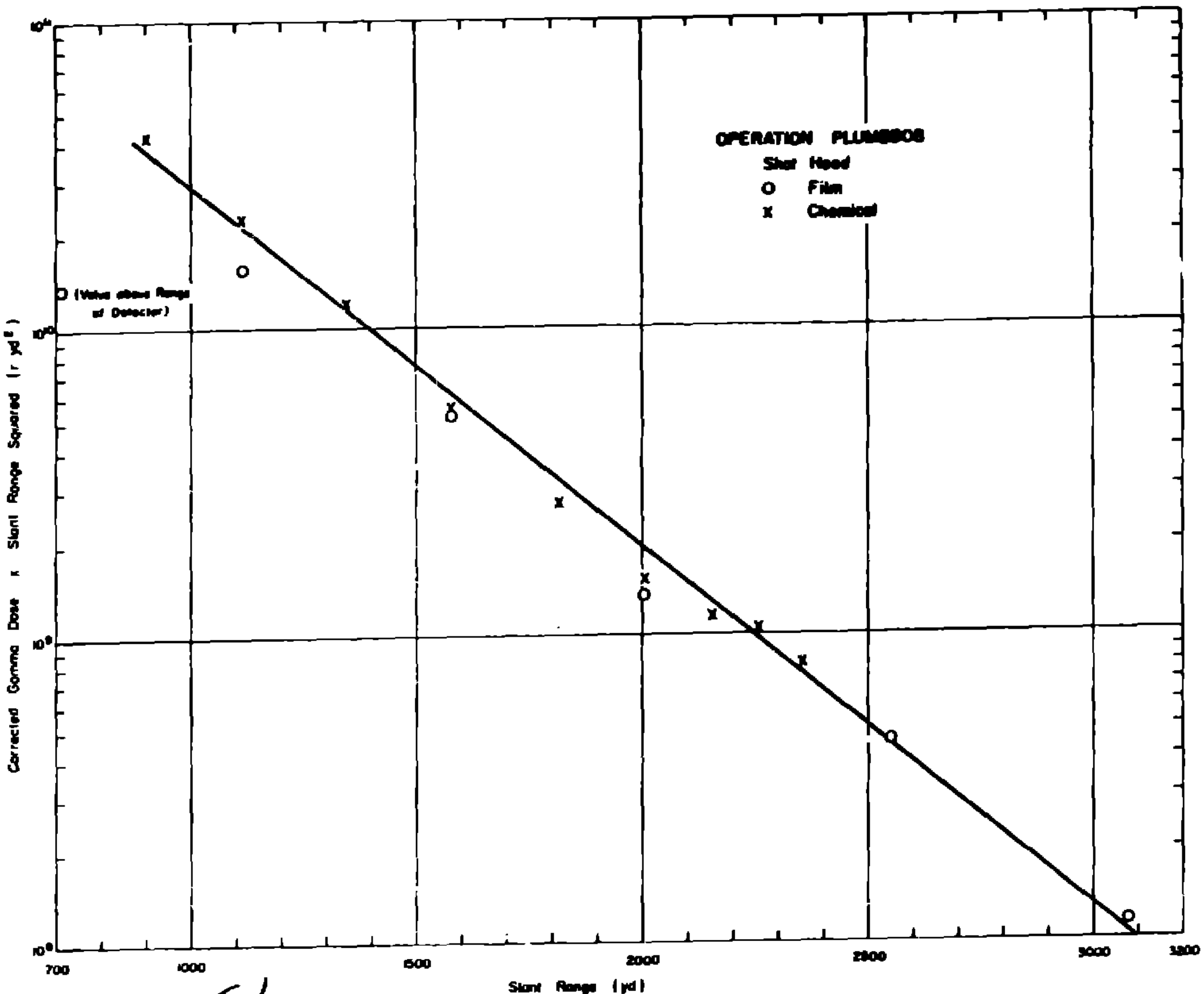


Figure 3.68 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Hood - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) ~~(S-RD)~~ TABLE 3.98 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT DIABLO

Slant Range	Azimuth	Type Detector	Uncorrected Gamma Dose	Neutron Flux Au Pu Np U S	Shield Type
yd			r	n/cm²	
719	90°	Chemical	8,500	a	Beer Mug w/Li
1,013	90°	Chemical	1,850	a	Beer Mug w/Li
1,212	90°	Chemical	740	a	Beer Mug w/Li
1,510	90°	Chemical	213	a	
1,679	90°	Film 606	77	a	Whitney Tower
1,679	90°	Chemical	64	a	Whitney Tower
2,714	90°	Film 502	1.85	a	Smoky Tower

[a]No neutron data available.

(U) ~~(S-RD)~~ TABLE 3.99 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT KEPLER

Slant Range	Azimuth	Type Detector	Uncorrected Gamma Dose	Neutron Flux Au Pu Np U S	Shield Type
yd			r	n/cm²	
527	90°	Chemical	7,200	a	Beer Mug w/Li
1,013	90°	Chemical	295	a	Beer Mug w/Li
1,510	90°	Chemical	36	a	Beer Mug w/Li

[a]Insufficient neutron data to extrapolate to slant ranges of interest.

175

(U) ~~(S-RD)~~ TABLE 3.100 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT OWENS

Slant Range	Azimuth	Dosimeter Type	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
2[illegible]	a	Chemical	176,000[c]	1.36x10[14]	[illegible]x10[15]	7.64x10[14]	1.45x10[14]
34[illegible]	a	Chemical	127,000[c]	1.21x10[14]	[illegible]x10[14]	2.46x10[14]	[illegible]x10[13]
4[illegible]	a	Chemical	77,000[c]	4.07x10[13]	[illegible]x10[14]	9.57x10[13]	4.[illegible]x10[13]
[illegible]7	a, b	Film [illegible]	>70,000	2.71x10[13]	[illegible]x10[13]	5.51x10[13]	1.2[illegible]x10[13]
[illegible]	a, b	Film [illegible]	4,200	9.[illegible]x10[11]	5.[illegible]x10[12]	2.82x10[12]	7.[illegible]x10[11]
[illegible]	a, b	Film [illegible]	420	6.5[illegible]x10	4.[illegible]x10[11]	2.68x10[11]	5.49x10[10]
[illegible]	a, b	Film 606	54.5	5.96x10[9]	5.22x10[10]	1.35x10[10]	5.22x10[9]
2,[illegible]	a, b	502, 510	[illegible] 10.2	6.06x10[8]	6.06x10[9]	4.46x10[9]	5.26x10[8]

Slant Range	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
2[illegible]	e	d	e	71,[illegible]	71,[illegible]	105,000	1.25	131,000	156,000
34[illegible]	e	d	e	[illegible]	[illegible]	83,900	1.25	105,000	62,400
4[illegible]	e	d	e	17,[illegible]	[illegible]	54,700	1.25	68,400	28,600
[illegible]7	3,080	33,200	f	9,400	45,680	>34,000	1.23	>42,000	11,300
[illegible]	106	1,760	f	337	2,203	2,000	1.23	2,460	460
[illegible]	15.0	22.1	f	24.3	61.4	359	1.14	410	34
[illegible]	1.40	2.40	f	2.30	[illegible].48	48.4	1.14	55.2	3.0
2,[illegible]	0.15 0.13	0.10 0.38	f	0.23	0.48,0.74	9.2, 9.5	1.14	10.5, 10.8[f]	0.44

[illegible]

[illegible]

[illegible] were subtracted before the gamma results were reported.

[illegible]

[illegible]

[illegible]

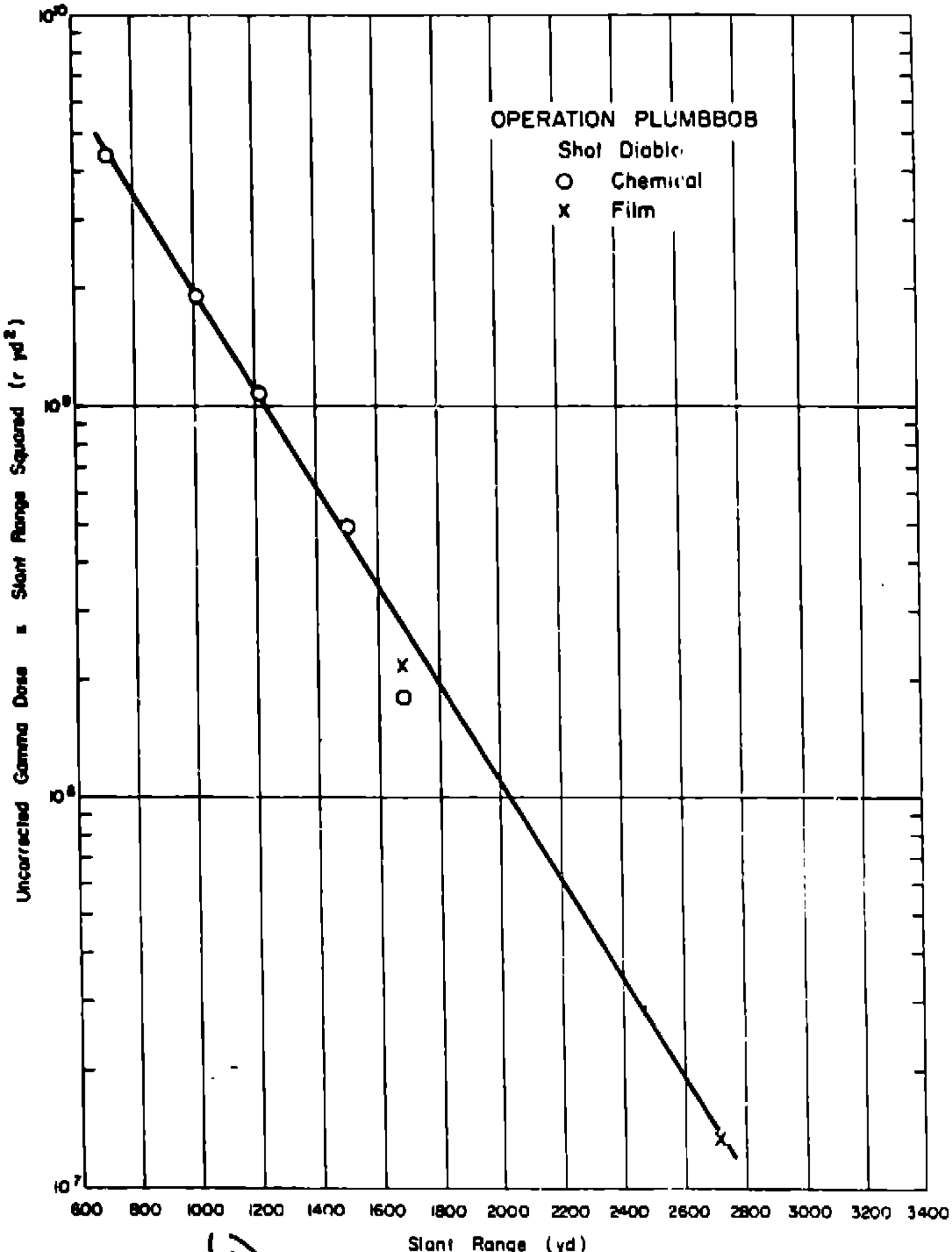


Figure 3.69 (U) ~~(S-RD)~~ Operation Plumbbob - Shot Diablo - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

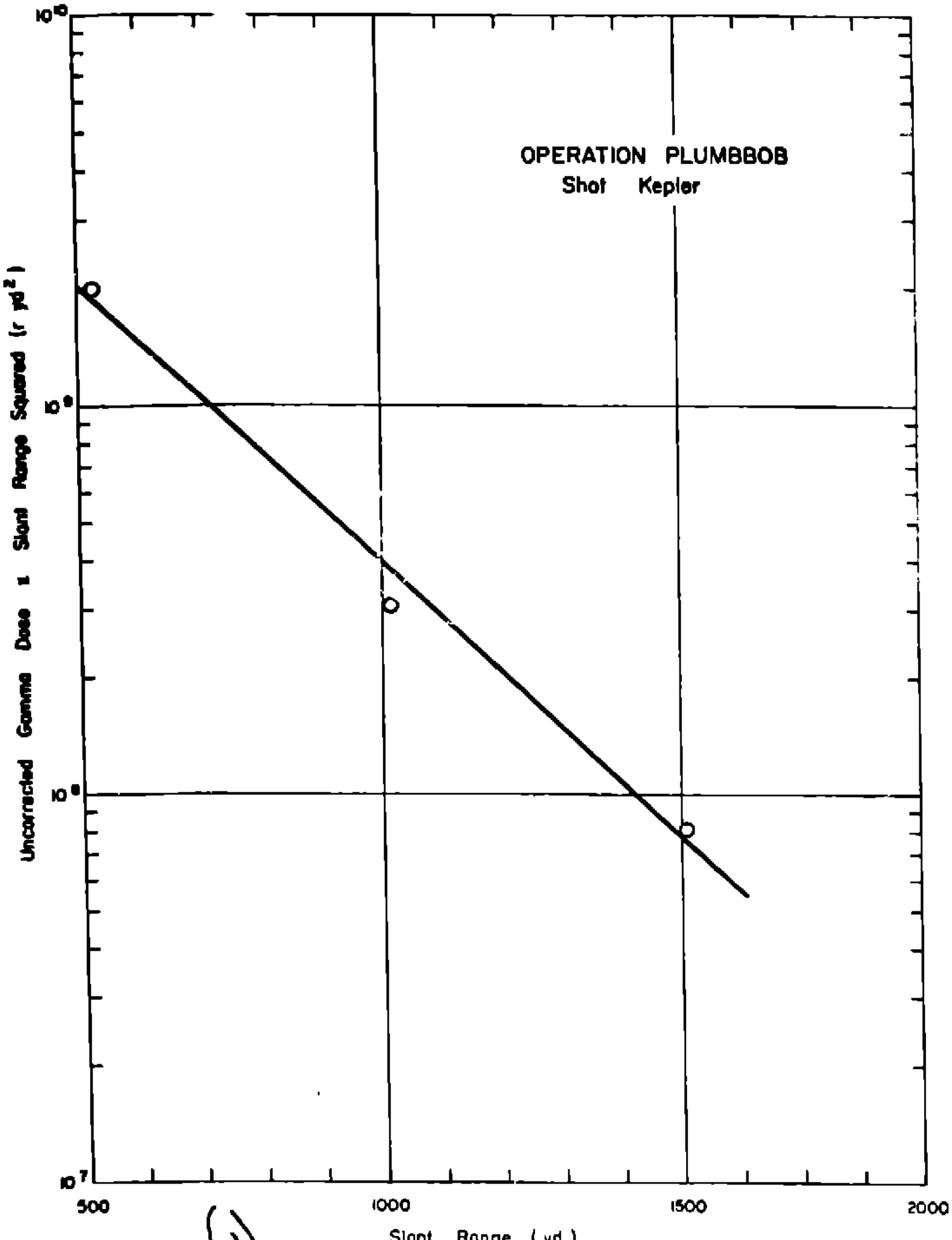


Figure 3.70 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Kepler - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

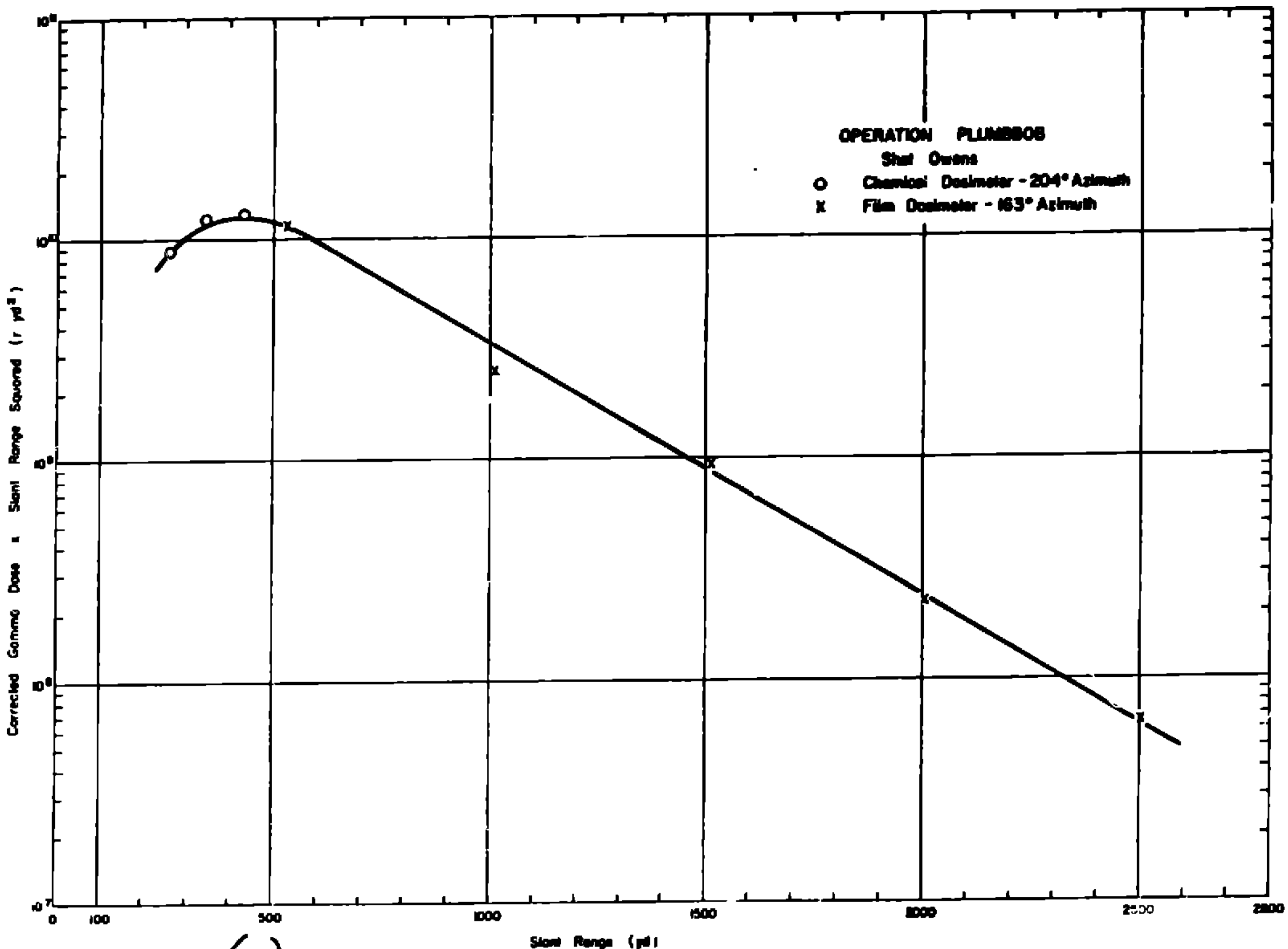


Figure 3.71 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Owens - Corrected gamma-dose-times-slant-range squared versus slant-range (U).

(U)

(U) TABLE 3.101 INITIAL GAMMA DOSE DATA - OPERATION [illegible], SHOT [illegible]

Slant Range	Type of Detector	Corrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
[illegible]			n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
[illegible]		19,[illegible]	[c][illegible]	[illegible]	[illegible]	[illegible]	d	d	[illegible]	19.0	19.0	19,[illegible]	1.05	[illegible]	1,[illegible]0
[illegible]	b	12,[illegible]	[illegible]	9.10x10[illegible]	[illegible]	1.5[illegible]	d	d	e	62.0	6[illegible]	12,[illegible]	1.0[illegible]	13,[illegible]	1,150
[illegible]	[illegible]	[illegible]	[illegible]x10[illegible]	4.60x10[illegible]	[illegible]	[illegible]	d	d	e	39.0	3[illegible].0	7,310	1.05	7,[illegible]0	649
1,[illegible]	b	4,[illegible]	[illegible]	2.83x10[illegible]	[illegible]	[illegible]	d	d	e	2[illegible].0	23.0	4,[illegible]0	1.05	5,120	352
[illegible]	b	[illegible]	[illegible]x10[illegible]	1.00x10[illegible]	[illegible]	[illegible]	d	d	[illegible]	16.0	16.0	3,[illegible]0	1.06	3,320	200
1,[illegible]	[illegible]	1,[illegible]	[illegible]x10[illegible]	4.3[illegible]x10[illegible]	[illegible]	[illegible]	d	d	e	3.90	3.90	1,0[illegible]	1.06	1,0[illegible]	55.[illegible]
[illegible]	b	[illegible]	4.40x10[illegible]	1.20x10[illegible]	[illegible]	2.[illegible]	d	d	e	1.[illegible]	1.27	3[illegible]	1.06	405	14.9

[a] [illegible]
[b] [illegible]
[c] [illegible] are estimated.
[d] [illegible] use.
[e] [illegible] with lithium.

(U)

(U) TABLE 3.102 INITIAL GAMMA DOSE DATA - OPERATION [illegible], SHOT [illegible]

Slant Range	Azimuth	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U	Neutron Flux: S	Shield Type	Attenuation Factor
[illegible]		r	n/cm²	n/cm²	n/cm²	n/cm²	n/cm²		
[illegible]	a	311[illegible]		No Neutron Data Available				[illegible]	1.0
[illegible]	[illegible]	[illegible]		No Neutron Data Available				b	1.0
[illegible]	a	[illegible]		No Neutron Data Available				b	1.0
[illegible]	a	510,[illegible]		No Neutron Data Available				b	1.0

[a] [illegible]
[b] [illegible] badge on goal post.

(U)

(U) TABLE 3.103 INITIAL GAMMA DOSE DATA - OPERATION [illegible], SHOT [illegible]

Slant Range	Type of Detector	Corrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
[illegible]		[illegible]	n/cm²	n/cm²	[illegible]	n/cm²	r	r		r	r	r		r	r
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c			[illegible]	[illegible]	[illegible]	1,[illegible]	1,[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c	c			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	144
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		c	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]				[illegible]	[illegible]		[illegible]
[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.[illegible]

[a] [illegible]
[b] [illegible]
[c] [illegible]

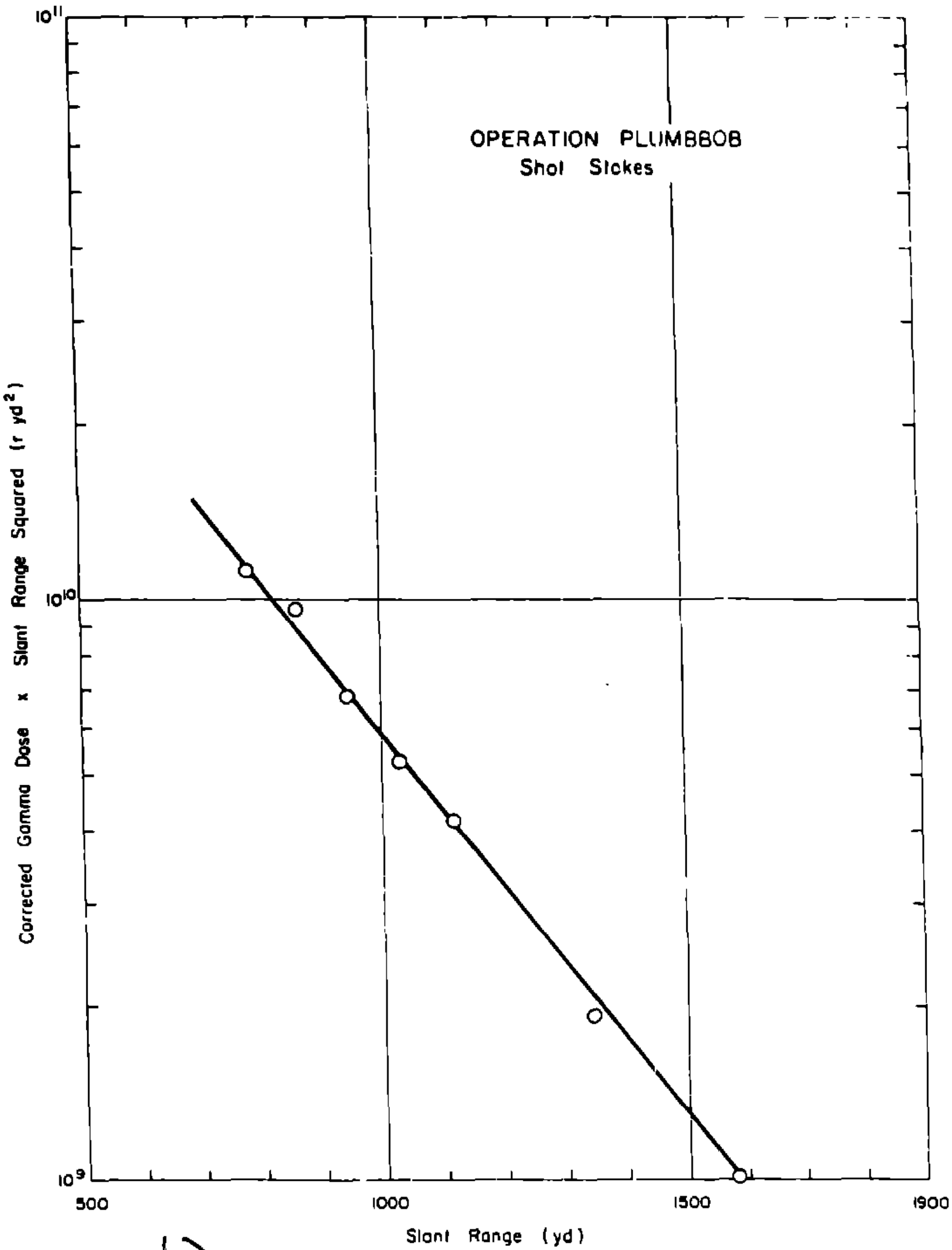


Figure 3.72 ~~(S-RD)~~ (U) Operation Plumbob - Shot Stokes - Corrected gamma-dose-times-slant-range-squared versus slant range (U).

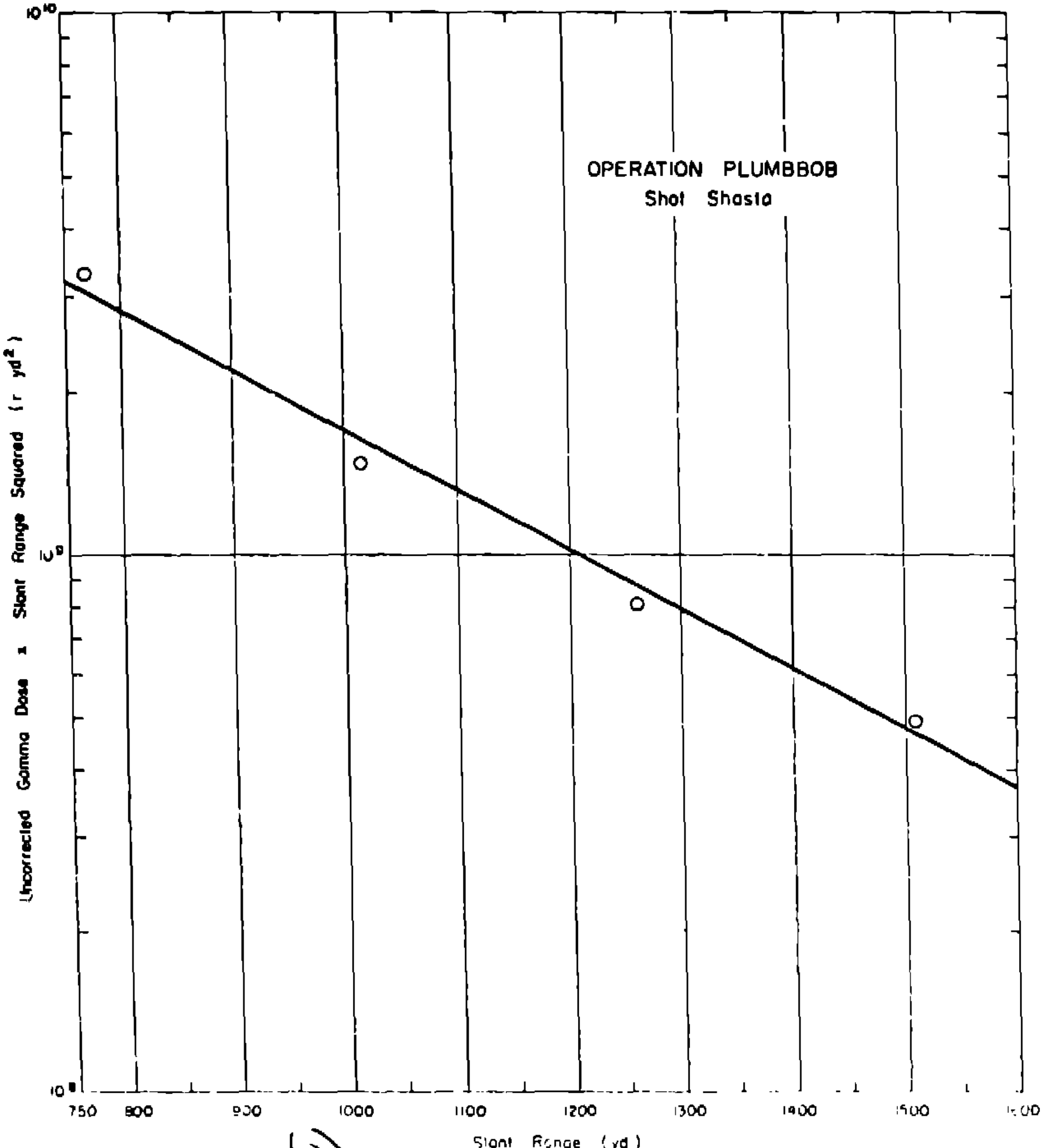


Figure 3.73 (~~S-RD~~) (U) Operation Plumbbob - Shot Shasta - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

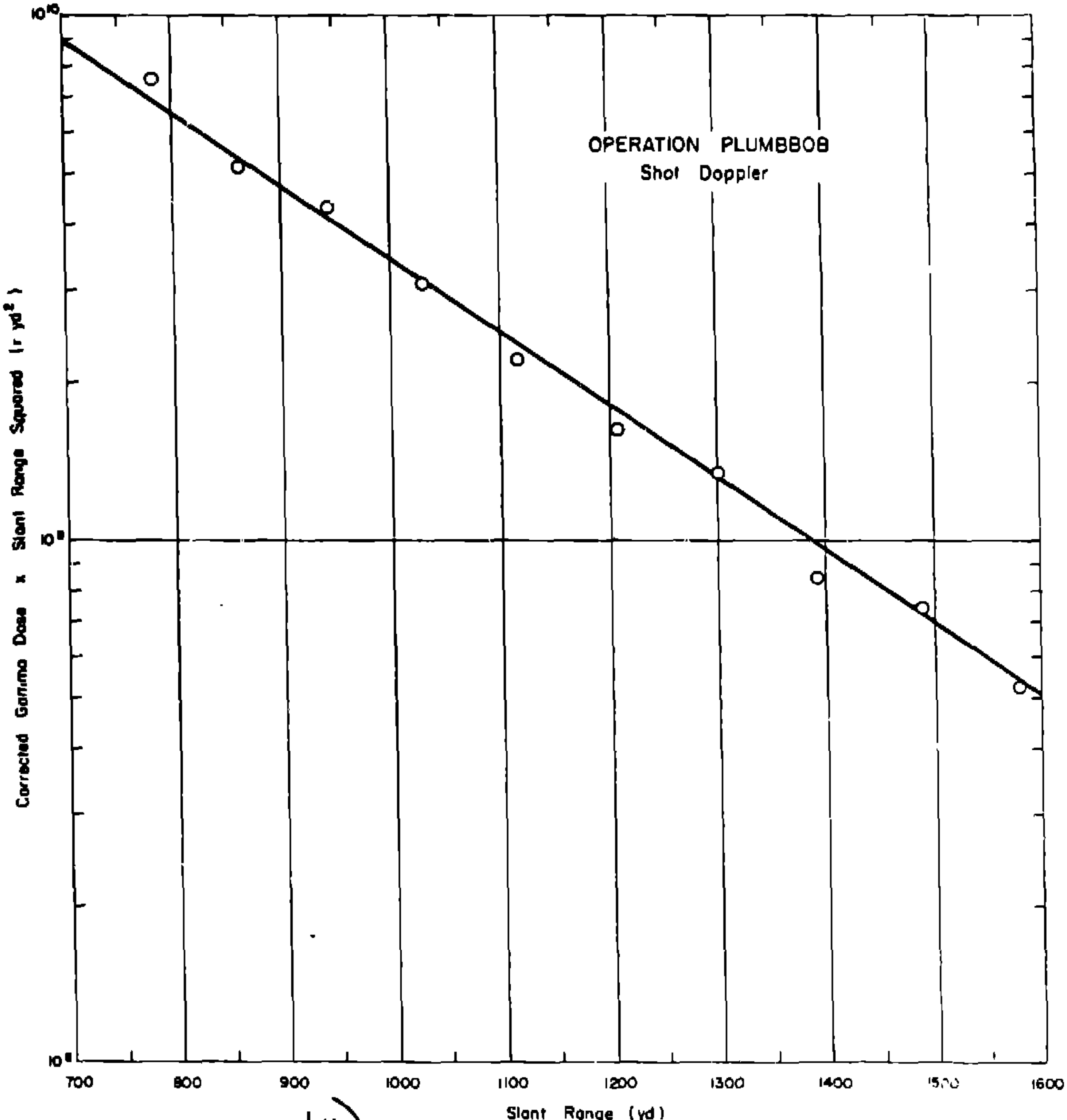


Figure 3.74 (U) ~~(S-RD)~~ Operation Plumbbob - Shot Doppler - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE [illegible] INITIAL GAMMA DOSE DATA - [illegible] PLUMBBOB, SHOT FRANKLIN PRIME

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
[illegible]	a	b	11,[illegible]52	2.[illegible]x10^12	[illegible]x10^12	4.[illegible]x10^[illegible]	[illegible]x10^12	c	c	d	73.4	73.4	11,[illegible]	1.05	1[illegible]	1230
[illegible]	[illegible]	b	7,050	1.32x10^12	5.30x10^12	2.1[illegible]x10^[illegible]	6.98x10^11	c	c	d	[illegible]	[illegible]	7,010	1.05	7,360	636
744	[illegible]	b	3,840	7.04x10^11	2.71x10^12	1.0[illegible]x10^12	4.09x10^11	c	c	d	20.2	20.2	3,820	1.05	4,010	317
[illegible]	[illegible]	b	2,000	3.80x10^11	1.42x10^12	5.85x10^11	2.70x10^11	c	c	d	11.0	11.0	1,990	1.05	2,090	161
[illegible]	a	b	1,175	2.08x10^11	8.07x10^11	3.15x10^11	1.48x10^11	c	c	d	6.00	6.00	1,167	1.05	1,227	93.0
1,03[illegible]	a	b	770	1.29x10^11	4.70x10^11	1.98x10^11	8.47x10^10	c	c	d	3.71	3.71	766	1.05	804	50.7
1,2[illegible]	a	b	232	3.07x10^10	1.23x10^11	4.60x10^10	2.15x10^10	c	c	d	0.88	0.88	231	1.04	240	12.2

[a] 160°.
[b] Chemical.
[c] Negligible.
[d] Beer Mug with lithium.

(U) TABLE 3.105 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT SMOKEY

Slant Range	Azimuth	Type of Dosimeter	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
651	a	b	47,000	[illegible]	2.[illegible]x10^12	[illegible]	4.0[illegible]x10^12	d	d		[illegible]	2[illegible]	46,[illegible]00	1.05	49,100	3,[illegible]00
[illegible]	a	b	37,000	6.[illegible]x10^12	2.03x10^12	[illegible]	[illegible]x10^12	d	d	[illegible]	[illegible]	1[illegible]	[illegible]	1.05	3[illegible],[illegible]00	2,640
[illegible]	[illegible]		2[illegible]	3.0[illegible]x10^[illegible]	1.31x10^12	[illegible]	1.72x10^12	d	d		10[illegible]	10[illegible]	24,[illegible]	1.05	2[illegible],100	1,520
[illegible]10	a	b	1[illegible]	2.[illegible]x10^12	9.04x10^12	[illegible]x10^12	1.13x10^12	d	d		[illegible]	79.2	18,900	1.05	19,800	1,110
[illegible]1	a	b	13,[illegible]	–	7.41x10^12	6.[illegible]x10^[illegible]	9.84x10^11	d	d		-	-	-	1.05	-	-
[illegible]	a	[illegible]	1[illegible]	c	c	c	c	d	d		-	-	-	1.05	-	-
8[illegible]0	[illegible]	[illegible]	[illegible]	c	c	[illegible]	c	[illegible]	d		-	-	-	1.05	-	-
[illegible]	[illegible]		4,[illegible]	c	c	c	c	d	d		-	-	-	1.05	-	-
1,00[illegible]	a	[illegible]	[illegible]	c	c	c	c	d	d		-	-	-	1.05	-	-
1,0[illegible]	[illegible]	[illegible]	[illegible]	c	c		c	[illegible]	d		-	-	-	[illegible]	-	-
1,0[illegible]	a	[illegible]	[illegible]	c	c		c	[illegible]	[illegible]		-	-	-	[illegible]	-	-
[illegible]		[illegible]	4,[illegible]	c	c	[illegible]	c	d	d	[illegible]	-	-	-	[illegible]	-	-
1,[illegible]	[illegible]	[illegible]	2,[illegible]		c	[illegible]	c	d	[illegible]		-		-	[illegible]	-	-
1,62[illegible]	[illegible]		1,[illegible]	c		[illegible]	c	d	[illegible]		-	-	-	[illegible]	-	-
1,[illegible]	[illegible]	[illegible]	[illegible]	c	c	[illegible]	c	d	d		-	-	-	1.0[illegible]	-	-
1,[illegible]	[illegible]	[illegible]	[illegible]0	[illegible]	c	[illegible]	c	d	[illegible]		-	-	-	1.0[illegible]	-	-

[a] [illegible]
[b] [illegible]
[c] [illegible] terrain effects were very pronounced, the neutron data cannot be extrapolated to [illegible].
[d] [illegible]
[e] [illegible] Beer [illegible] lithium.

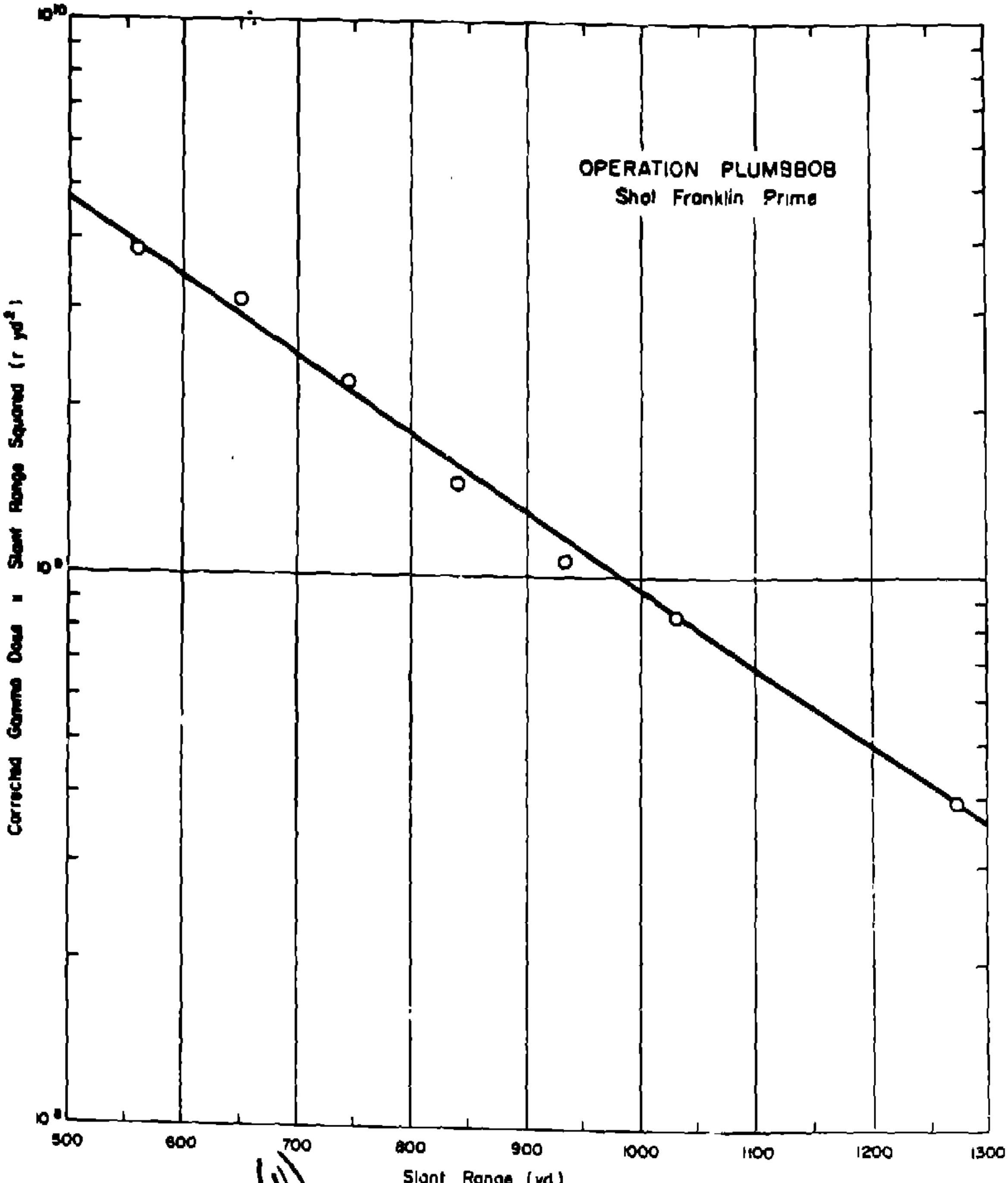


Figure 3.75 (U) Operation Plumbbob - Shot Franklin Prime - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

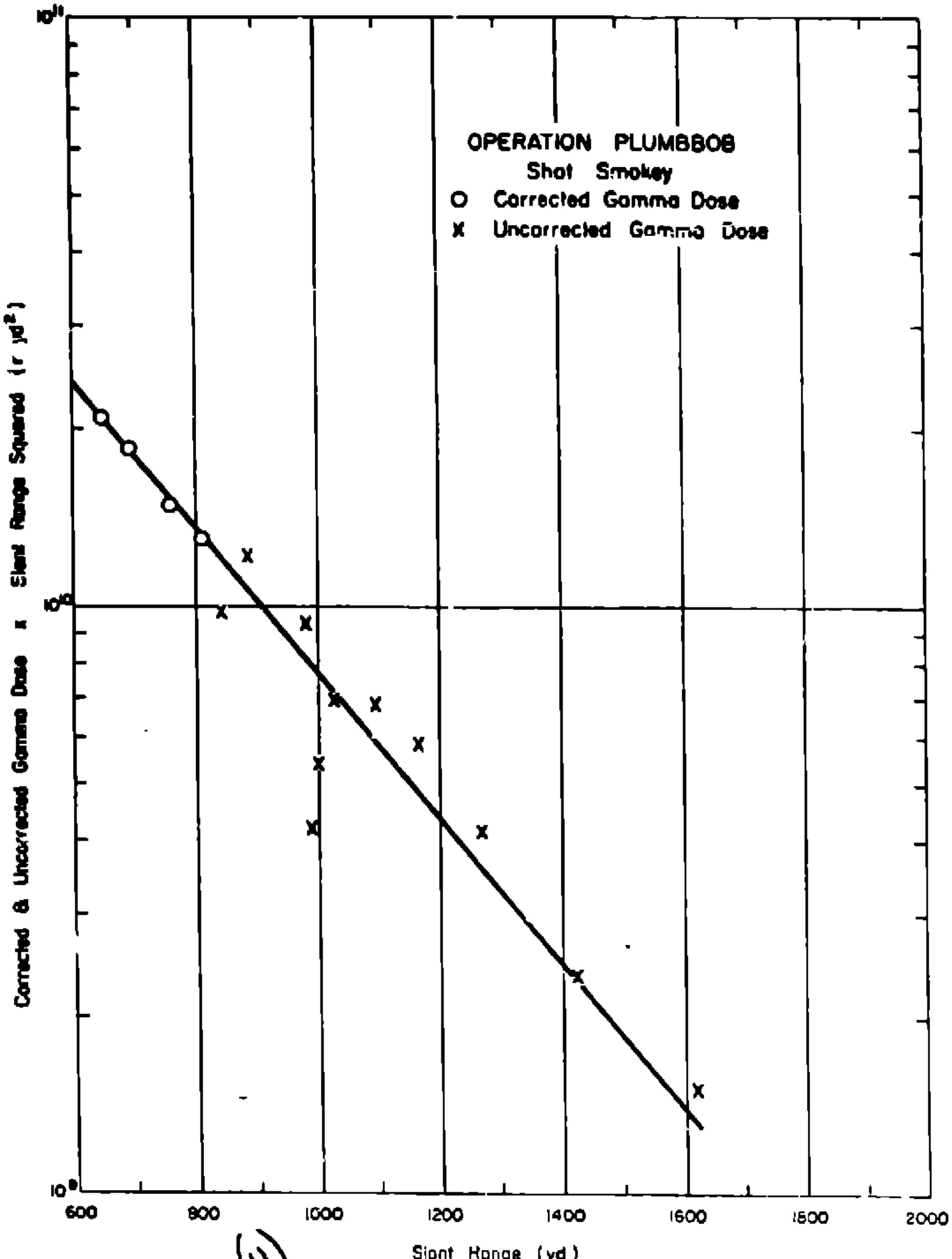


Figure 3.76 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Smokey - Corrected and Uncorrected gamma-dose-times-slant-range squared versus-slant range (U).

(U) ~~(S-RD)~~ TABLE 3.106 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT GALILEO

Slant Range	Azimuth	Film Type	Uncorrected Gamma Dose	Neutron Flux					Shield Type
				Au	Pu	Np	U	S	
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	n/cm²	
1,228	90°	1112, 606	363.8	No neutron data available					a
1,326	90°	1112, 606	282.2	No neutron data available					a
1,442	90°	510	108.7	No neutron data available					a
1,624	90°	510	79.0	No neutron data available					a
1,673	90°	510	69.8	No neutron data available					a
2,0 2	90°	510	23.0	No neutron data available					a
2,128	90°	502, 510	14.1	No neutron data available					a
2,222	90°	502	11.5	No neutron data available					a
3,402	90°	502	0.68	No neutron data available					a

[a] EG&G film badge attached to stake.

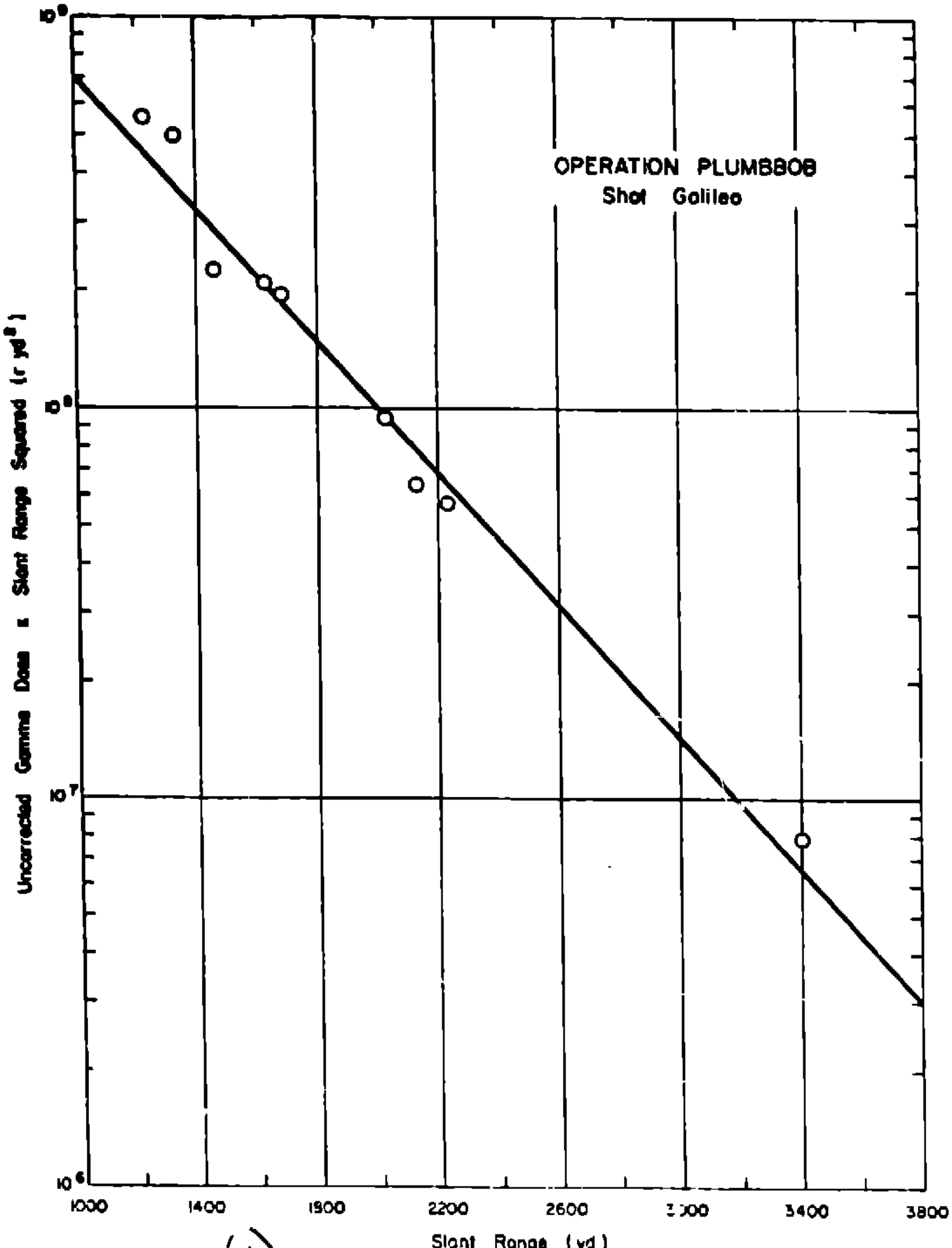


Figure 3.77 ~~(S-RD)~~ (U) Operation Plumbbob - Shot Galileo - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

[illegible] TABLE 3.107 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT LAPLACE

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux Au	Neutron Flux Pu	Neutron Flux Np	Neutron Flux U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
558	a	Chemical	3900	1.81×10^{12}	4.76×10^{12}	2.55×10^{12}	4.46×10^{10}
790	a	Chemical	880	3.21×10^{11}	8.97×10^{11}	4.81×10^{11}	8.49×10^{10}
837	a	Film 606	1400	2.20×10^{11}	6.76×10^{11}	3.72×10^{11}	6.85×10^{10}
837	a	606	1300	2.26×10^{11}	6.66×10^{11}	3.72×10^{11}	6.85×10^{10}
934	a	606	715	1.31×10^{11}	3.75×10^{11}	1.94×10^{11}	4.27×10^{10}
934	a	606	665	1.31×10^{11}	3.75×10^{11}	1.94×10^{11}	4.27×10^{10}
1,030	a	606	350	7.07×10^{10}	2.17×10^{11}	1.23×10^{11}	2.07×10^{10}
1,030	a	Chemical	230	7.07×10^{10}	2.17×10^{11}	1.23×10^{11}	2.07×10^{10}
1,125	a	Film 606	208	3.64×10^{10}	1.02×10^{11}	5.97×10^{10}	1.19×10^{10}
1,225	a	606	120	2.33×10^{10}	6.67×10^{10}	3.73×10^{10}	7.33×10^{9}
1,275	a	Chemical	82	1.66×10^{10}	4.92×10^{10}	2.71×10^{10}	5.23×10^{9}
1,325	a	Film 606	76	1.31×10^{10}	3.82×10^{10}	2.11×10^{10}	4.16×10^{9}
1,420	a	506	44	7.69×10^{9}	2.01×10^{10}	9.71×10^{9}	2.43×10^{9}
1,520	a	606	29	4.37×10^{9}	1.30×10^{10}	6.93×10^{9}	1.43×10^{9}
1,520	a	Chemical	36	4.37×10^{9}	1.30×10^{10}	6.93×10^{9}	1.43×10^{9}
1,620	a	Film 510	20	2.67×10^{9}	7.62×10^{9}	4.08×10^{9}	8.77×10^{8}
1,720	a	510	14	1.59×10^{9}	4.40×10^{9}	2.37×10^{9}	5.07×10^{8}
1,815	a	510	10	9.72×10^{8}	2.64×10^{9}	1.40×10^{9}	3.13×10^{8}
1,915	a	502	6.7	5.73×10^{8}	1.64×10^{9}	8.18×10^{8}	1.66×10^{8}
2,015	a	502	4.9	3.45×10^{8}	9.86×10^{8}	4.93×10^{8}	1.16×10^{8}
2,215	a	502	2.6	1.28×10^{8}	3.67×10^{8}	1.79×10^{8}	4.38×10^{7}
2,410	a	502	1.4	4.82×10^{7}	1.29×10^{8}	6.32×10^{7}	1.70×10^{7}
2,610	a	502	0.83	1.84×10^{7}	4.90×10^{7}	2.56×10^{7}	6.90×10^{6}
2,810	a	502	0.54	7.04×10^{6}	1.90×10^{7}	9.17×10^{6}	2.41×10^{6}
3,010	a	502	0.38	2.70×10^{6}	7.25×10^{6}	3.46×10^{6}	7.04×10^{5}

Slant Range	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
558	b	b	c	51.6	51.6	3850	1.05	4040	486
790	b	b	c	9.20	9.20	871	1.05	915	125
837	51.8	30.5	d	80.0	162	1240	1.25	1550	83.3
837	51.8	30.5	e	40.0	122	1180	1.0	1180	83.3
934	29.8	16.7	d	46.0	92.5	622	1.25	777	45.0
934	29.8	16.7	e	23.0	69.5	595	1.0	595	45.0
1,030	16.1	9.56	d	25.0	50.7	299	1.25	374	24.7
1,030	b	b	c	2.04	2.04	228	1.05	240	24.7
1,125	8.30	4.52	e	7.30	20.1	188	1.0	188	11.8
1,225	5.30	2.95	e	4.60	12.9	107	1.0	107	7.50
1,275	b	b	c	0.47	0.47	81	1.04	84	5.41
1,325	3.0	1.69	e	2.70	7.39	69	1.0	69	4.19
1,420	1.75	0.99	e	1.60	4.34	40	1.0	40	2.42
1,520	0.98	0.58	e	0.80	2.37	27	1.0	27	1.38
1,520	b	b	c	0.12	0.12	36	1.04	37	1.38
1,620	0.58	0.46	e	0.50	1.54	18	1.0	18	0.81
1,720	0.35	0.27	e	0.30	0.92	13	1.0	13	0.47
1,815	0.22	0.12	e	0.20	0.54	9.5	1.0	9.5	0.28
1,915	0.14	0.024	e	0.10	0.26	6.4	1.0	6.4	0.17
2,015	0.086	0.015	e	0.07	0.17	4.7	1.0	4.7	0.10
2,215	0.032	0.005	e	0.02	0.0527	2.5	1.0	2.5	0.037
2,410	<0.013	<0.001	e	<0.01	<0.014	1.4	1.0	1.4	<0.01
2,610	<0.013	<0.001	e	<0.01	<0.014	0.83	1.0	0.83	<0.01
2,810	<0.013	<0.001	e	<0.01	<0.014	0.54	1.0	0.54	<0.01
3,010	<0.013	<0.001	e	<0.01	<0.014	0.38	1.0	0.38	<0.01

a 225°.
b Negligible.
c CDRL Beer Mug with Lithium.
d NBS film badge in 0.551 cm thick pipe nipple.
e NBS film badge attached to stake.

[illegible] TABLE 3.108 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT FIZEAU

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Au	Pu	Np	U
yd			r	n/cm²	n/cm²	n/cm²	n/cm²
911	200°	a	4750	8.09×10^{11}	3.02×10^{12}	1.28×10^{12}	5.44×10^{11}
1,010	200°	a	2600	4.46×10^{11}	1.67×10^{12}	7.24×10^{11}	2.96×10^{11}
1,110	200°	a	1430	2.63×10^{11}	9.70×10^{11}	4.18×10^{11}	1.63×10^{11}
1,210	200°	a	825	1.56×10^{11}	5.44×10^{11}	2.65×10^{11}	1.08×10^{11}
1,210	195°	a	1070	1.56×10^{11}	5.44×10^{11}	2.65×10^{11}	1.08×10^{11}
1,210	185°	a	1100	1.56×10^{11}	5.44×10^{11}	2.65×10^{11}	1.08×10^{11}
1,310	185°	a	750	9.30×10^{10}	3.16×10^{11}	1.59×10^{11}	6.46×10^{10}
1,410	185°	a	505	6.27×10^{10}	2.01×10^{11}	9.06×10^{10}	3.84×10^{10}
1,509	185°	a	325	3.11×10^{10}	1.23×10^{11}	6.14×10^{10}	1.97×10^{10}
1,706	185°	a	210	2.31×10^{10}	7.72×10^{10}	3.63×10^{10}	1.51×10^{10}

Slant Range	Au Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd	r	r		r	r	r		r	r
911	b	b	c	23.2	23.2	4730	1.05	4970	306
1,010	b	b	c	12.8	12.8	2490	1.05	3140	140
1,110	b	b	c	7.00	7.00	1420	1.04	1490	90.2
1,210	b	b	c	4.50	4.50	820	1.04	853	53.3
1,210	b	b	c	4.50	4.50	1080	1.04	1120	53.3
1,210	b	b	c	4.50	4.50	1160	1.04	1210	53.3
1,310	b	b	c	2.00	2.00	747	1.04	777	31.2
1,410	b	b	c	1.50	1.00	503	1.04	523	14.5
1,509	b	b	c	0.59	0.59	324	1.04	337	11.1
1,706	b	b	c	0.06	0.06	215	1.04	224	7.3

a [illegible]
b [illegible]
c [illegible]

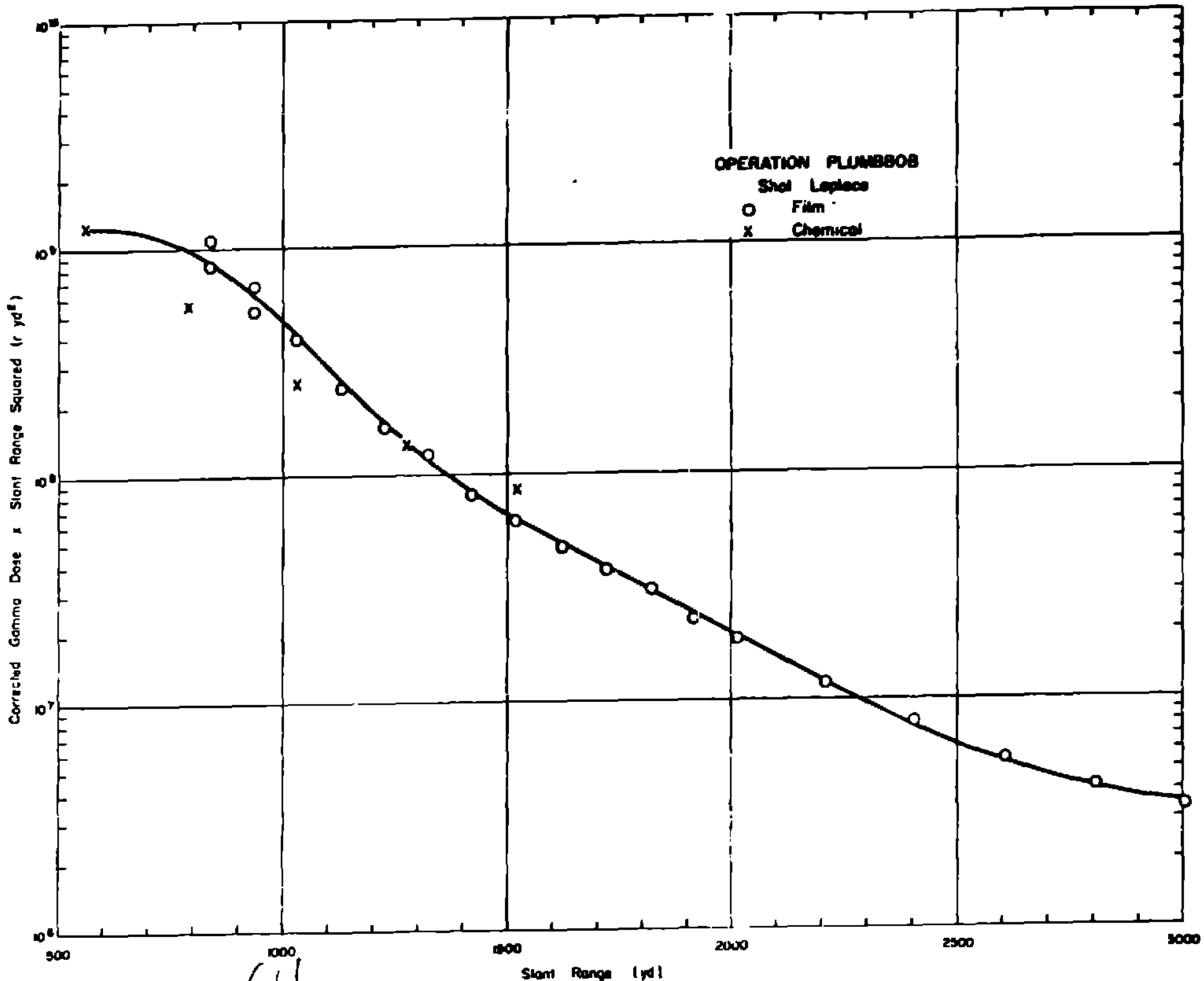


Figure 3.78 ~~(S-RD)~~ (U) Operation Plumbbob - Shot LaPlace - Corrected gamma dose times slant range squared versus slant range (U).

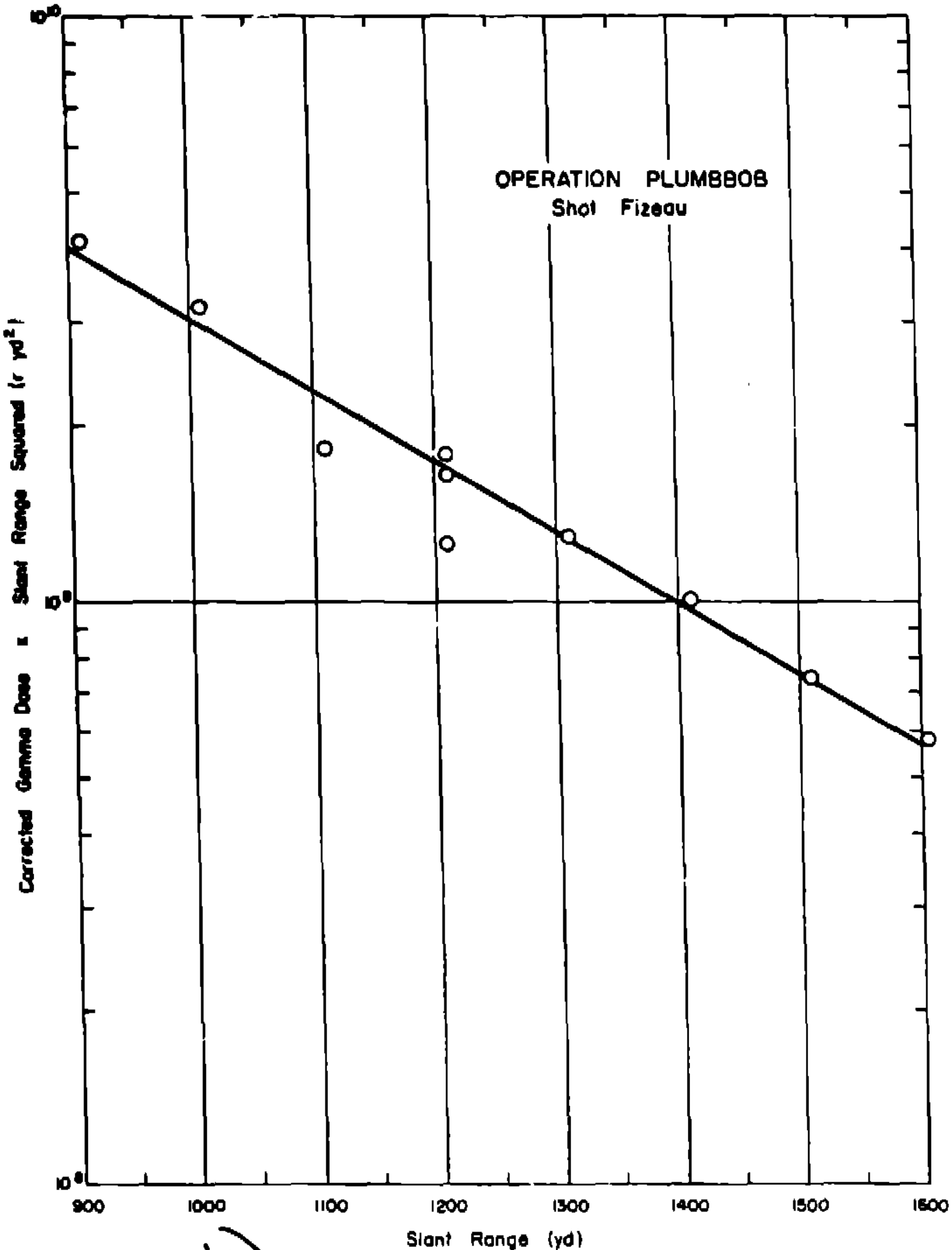


Figure 3.79 (~~S-RD~~) (U) Operation Plumbbob - Shot Fizeau - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) ~~(C-RD)~~ TABLE 3.109 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT WHITNEY

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux	Type of Shield
yd			r	n/cm²	
768	-	Film 1112	9,130	a	b
1,011	-	1112	2,160	a	b
[illegible]250	-	1112	630	a	b
1,509	-	606	241	a	b
1,760	-	510	87	a	b

[a] Neutron Data not available.
[b] EG&G film badge attached to stake.

(U) ~~(C-RD)~~ TABLE 3.110 INITIAL GAMMA DOSE DATA - OPERATION PLUMBBOB, SHOT CHARLESTON

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux	Type of Shield
yd			r	n/cm²	
2,102	120°	Chemical	39	a	b
2,201	120°	Chemical	28.5	a	b
2,300	120°	Chemical	41.5	a	b
2,400	120°	Chemical	13.5	a	b
2,500	120°	Chemical	< 10	a	b
2,102	[illegible]	Chemical	58	a	b
2,201	[illegible]	Chemical	35	a	b
2,300	[illegible]	Chemical	39	a	b
2,400	[illegible]	Chemical	19	a	b
2,500	[illegible]	Chemical	< 10	a	b

[a] No neutron data available.
[b] Beer Mug will [illegible].

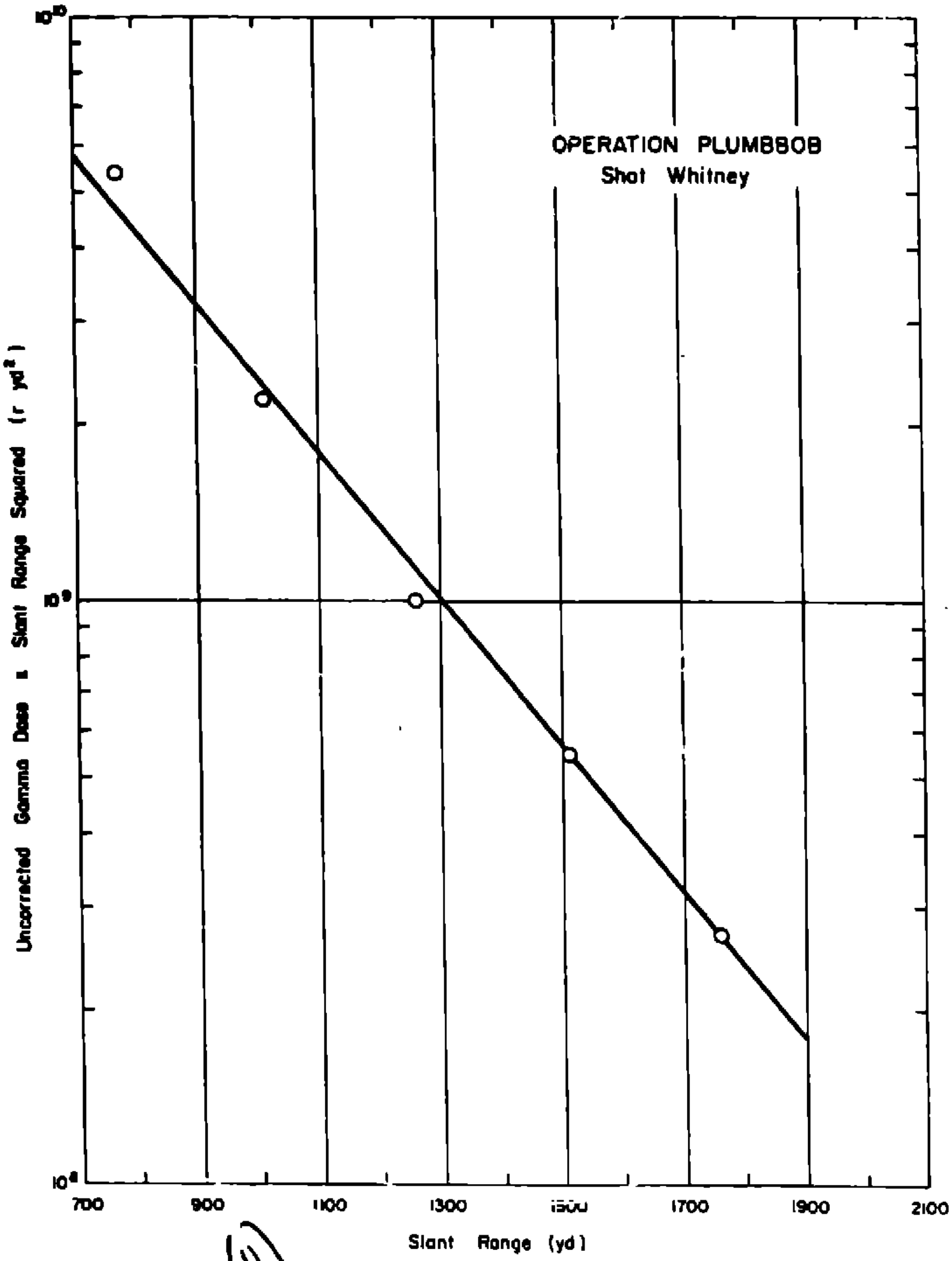


Figure 3.80 (S-RD) Operation Plumbbob - Shot Whitney - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

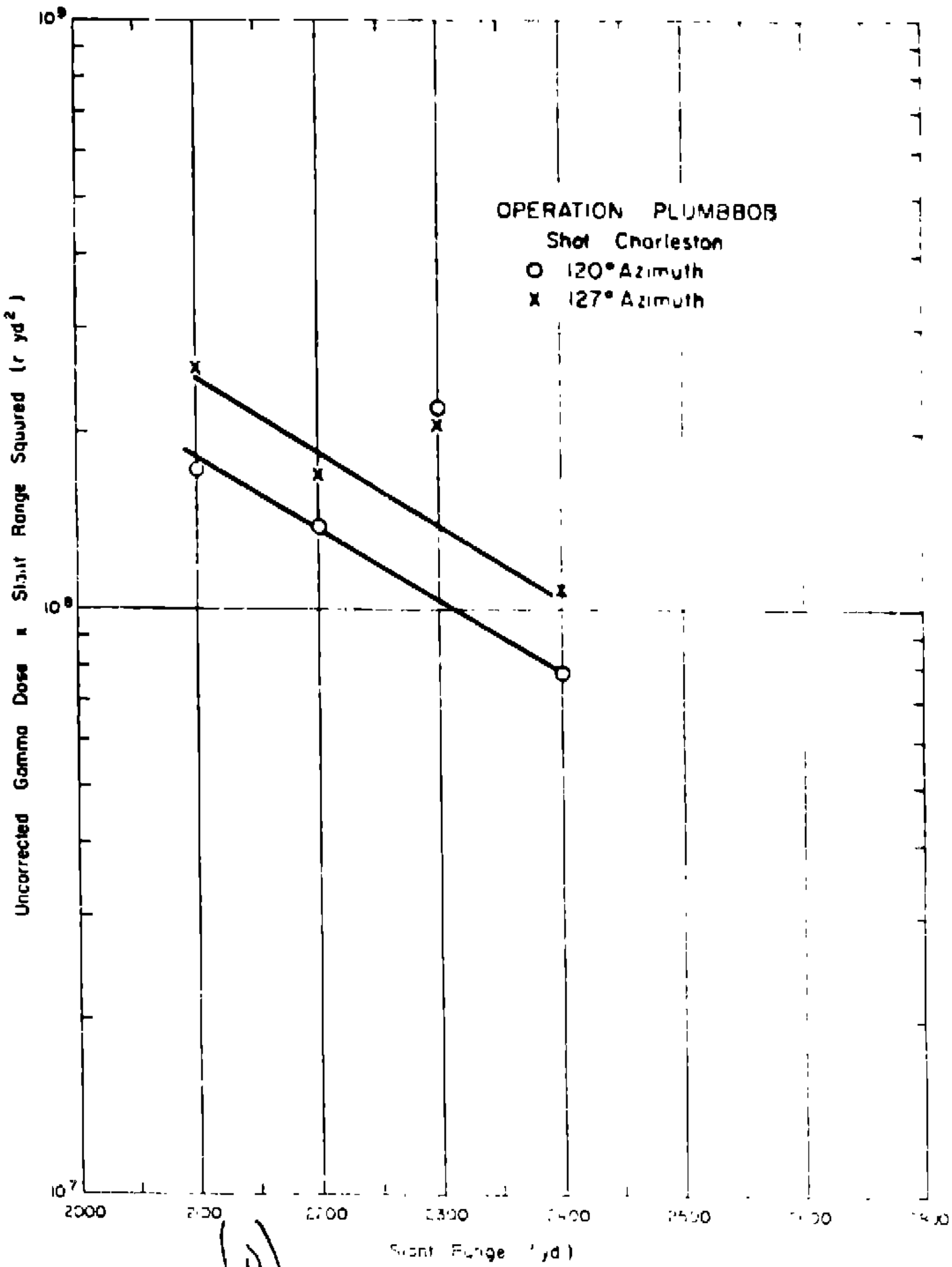


Figure 3.81 (S-RD) Operation Plumbbob - Shot Charleston - Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U)

~~(S-RD)~~ TABLE 3.111 SHOT INFORMATION - OPERATION HARDTACK

Shot Designation	Date and Time Fired	Location and Type	Yield Total
			kt
Fig	18 Aug 1958 0400:00 GMT	FPG-Site Yvonne-Surface	
Mora	29 Sept 1958 1405:00 GMT	NTS-Area 7 Balloon	2.0
Lea	13 Oct 1958 1320:00 GMT	NTS-Area 7 Balloon	1.5
Hamilton	15 Oct 1958 1600:00 GMT	NTS-F.F. Tower	1.17×10^{-3}
Socorro	22 Oct 1958 1330:00 GMT	NTS-Area 7 Balloon	6.2
Humboldt	29 Oct 1958 1445:00 GMT	NTS-Area 3 Tower	7.8×10^{-3}

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(U) TABLE 3.112 METEOROLOGICAL DATA - OPERATION HARDTACK

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^2$
	mb	°K	$g/cm^3 \times 10^3$		
Fig	1007	303	1.17	0.90	1.23
Mora	[illegible]	284.8	1.04	0.80	1.56
Lea	[illegible]	286.4	1.04	0.80	1.56
Hamilton	[illegible]	288.7	1.0[illegible]	0.83	1.45
Socorro	874	277.7	1.0[illegible]	0.82	1.49
Humboldt	[illegible]	2[illegible]0.4	1.10	0.85	1.39

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[illegible] INITIAL GAMMA DOSE DATA – OPERATION [illegible], SHOT [illegible]

[illegible]	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Pu	Np	U
yd		r	n/cm²	n/cm²	n/cm²	n/cm²
[illegible]	(cal)	3,1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	3,7[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1,4[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	1,27[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	(cal)	1,0[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	(cal)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	(cal)	177	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	454	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	(cal)	171	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	1.31x10¹¹	[illegible]	[illegible]
[illegible]	(cal)	[illegible]	[illegible]	[illegible]	2.31x10¹⁰	[illegible]
[illegible]	[illegible]	84	[illegible]	5.88x10¹⁰	2.31x10¹⁰	1.17x10¹⁰

Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
r	r		r	r	r		r	r
b	b	c	[illegible]	[illegible]	3,150	[illegible]	3,310	[illegible]
b	[illegible]	c	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
b	b	c	[illegible]	[illegible]	1,4[illegible]	[illegible]	1,520	[illegible]
b	25.7	c	[illegible]	[illegible]	1,2[illegible]	[illegible]	1,290	[illegible]
b	b	c	[illegible]	8.44	[illegible]	1.04	1,030	122
b	15.0	c	8.44	23.44	833	1.04	[illegible]	122
b	b	c	5.50	5.50	[illegible]	1.04	[illegible]	77.3
b	9.83	c	5.50	15.33	[illegible]	1.04	[illegible]	77.3
b	b	c	1.30	[illegible]	[illegible]	1.04	390	45.9
b	5.99	c	[illegible]	9.29	424	1.04	441	45.9
b	b	c	1.20	1.20	120	1.04	125	15.9
b	2.18	c	1.20	3.39	[illegible]	1.04	154	15.9
b	b	c	0.43	0.43	[illegible]	1.04	71	6.45
b	0.99	c	0.43	1.41	93	1.04	96	6.45

[illegible]

[illegible] INITIAL GAMMA [illegible] DATA – OPERATION HARDTACK, SHOT [illegible]

[illegible]	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Pu	Np	U
[illegible]		r	n/cm²	n/cm²	n/cm²	n/cm²
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Au Thermal Correction	Fast Correction	Shield Type	[illegible]	[illegible]	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
r	r		r	r	r		r	r
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	82[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

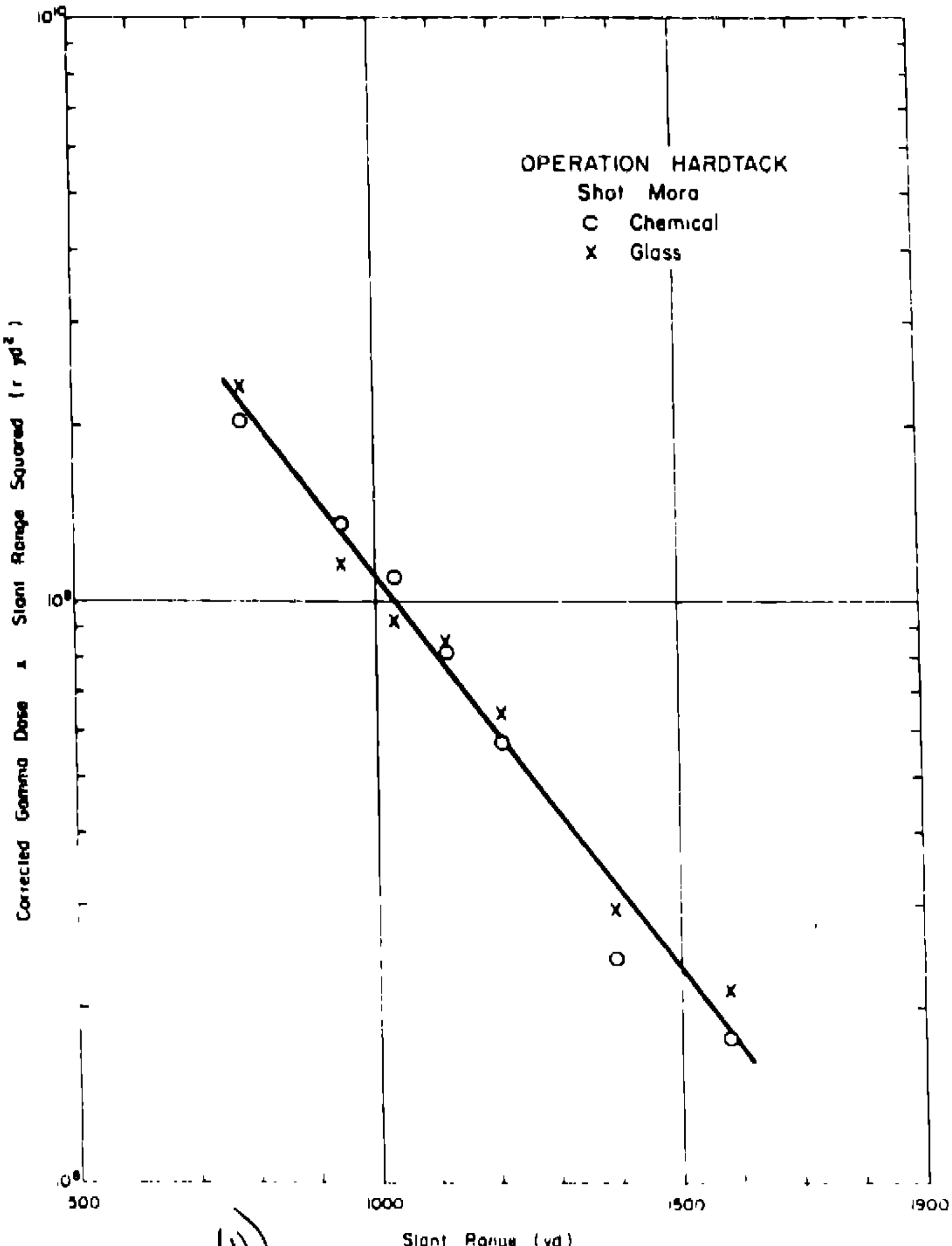
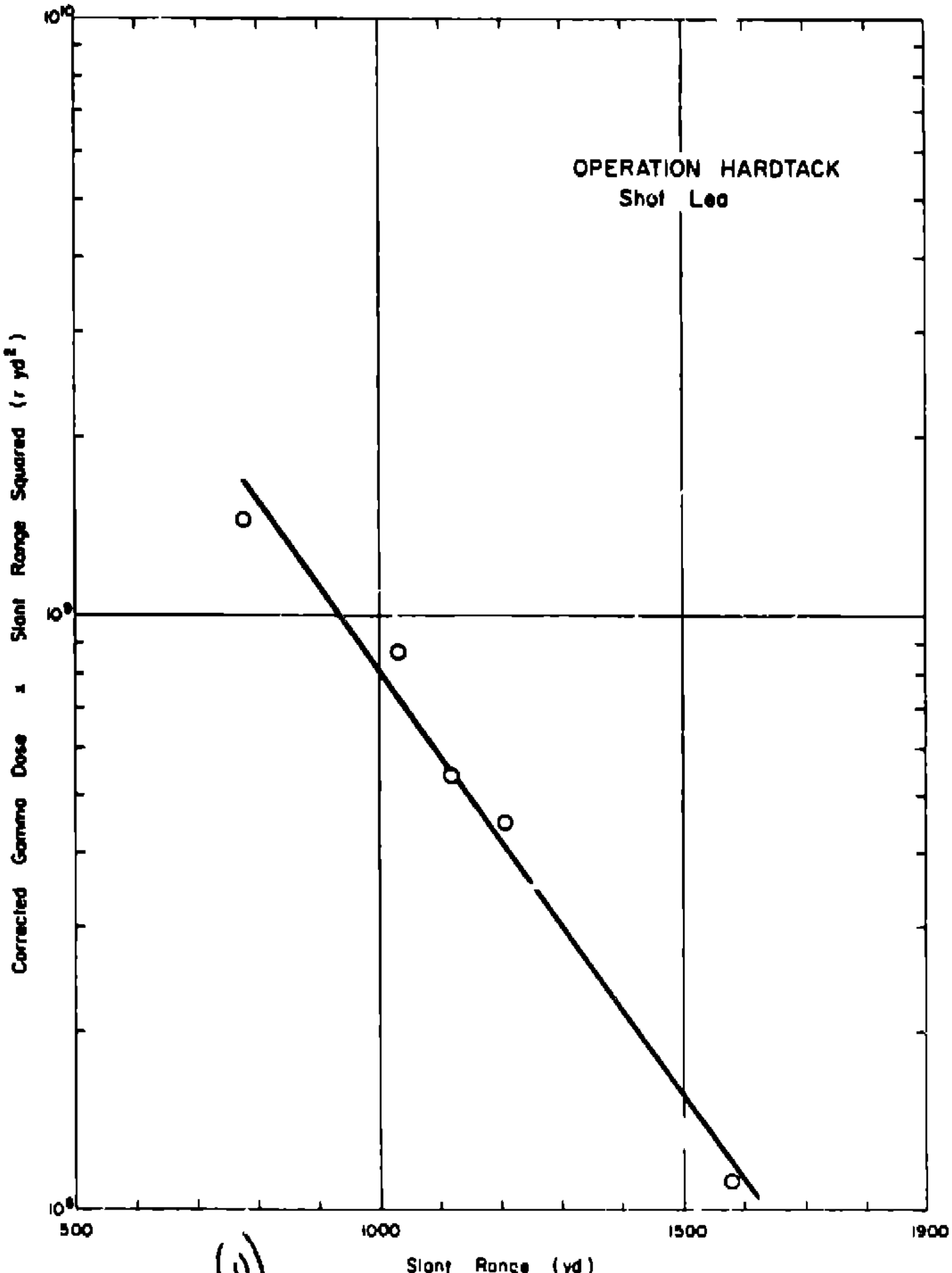


Figure 3.83 ~~(S-RD)~~ (U) Operation Hardtack - Shot Mora - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).



(U)

Figure 3.84 ~~(S-RD)~~ Operation Hardtack - Shot Lea - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

TABLE [illegible] INITIAL GAMMA DOSE DATA - OPERATION HARDTACK, SHOT HAMILTON

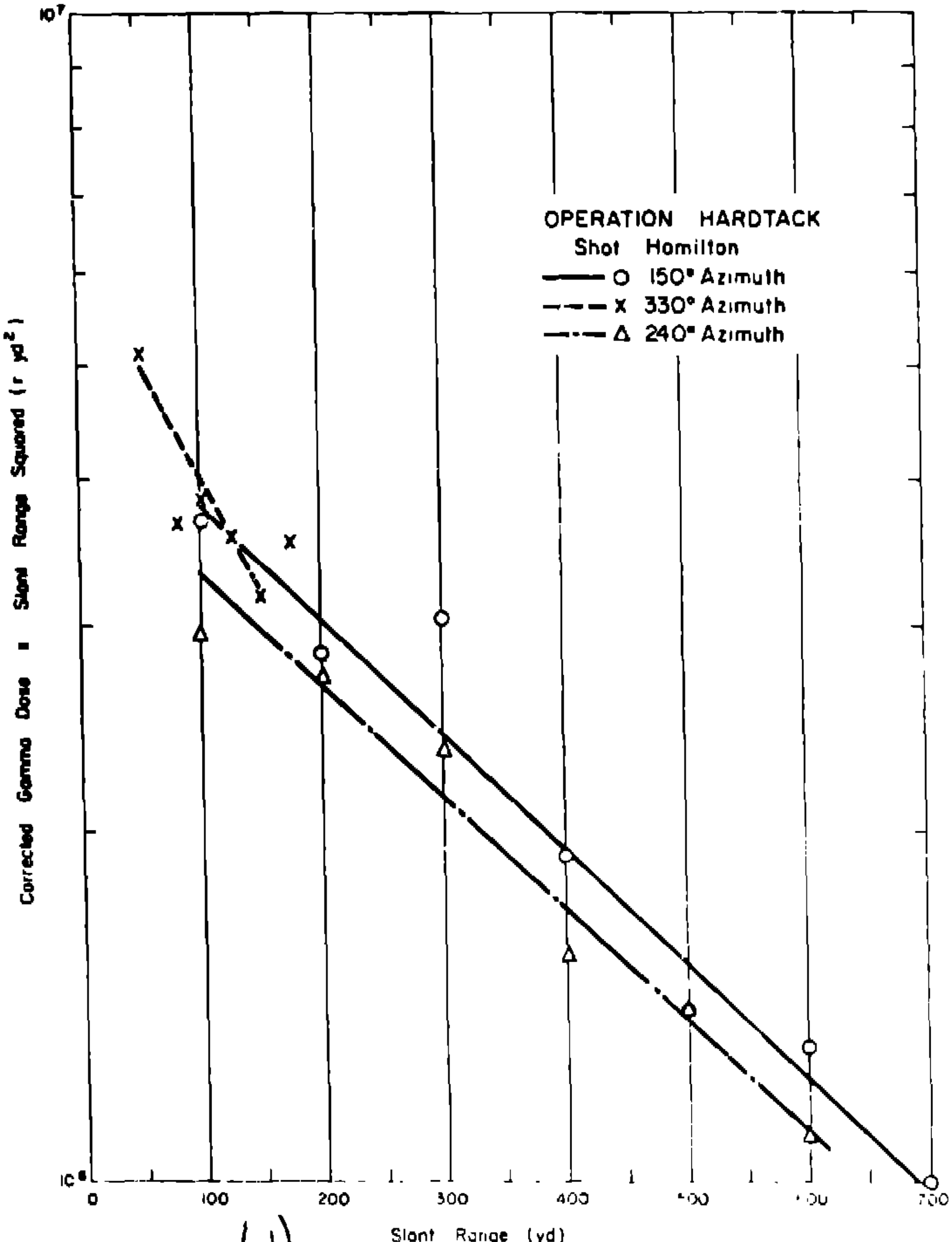
Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Pu	Np	U	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
101 3	15°	Film [illegible]	420	1.75×10^{12}	[illegible]	[illegible]	1.40×10^{11}	34.7	30.9	*	63.9	134.5	285	1.25	356	55.3
200	15°	[illegible]	80	3.13×10^{10}	[illegible]	[illegible]	[illegible]	7.10	5.10	*	11.3	23.5	57	1.25	71	9.10
300	15°	[illegible]	36.5	9.44×10^{9}	[illegible]	[illegible]	1.67×10^{9}	2.05	1.99	*	3.43	7.47	27.0	1.25	33.6	2.57
400	15°	[illegible]	12.4	3.75×10^{9}	[illegible]	[illegible]	2.36×10^{9}	0.82	0.71	*	1.37	2.90	9.50	1.25	11.9	0.94
500	15°	[illegible]	4.50	1.72×10^{9}	[illegible]	2.50×10^{9}	1.04×10^{9}	0.37	0.33	*	0.63	1.33	4.47	1.25	5.59	0.44
600	15°	[illegible]	3.70	[illegible]	[illegible]	[illegible]	4.72×10^{8}	0.22	0.04	*	0.31	0.57	3.13	1.15	3.60	0.20
700	15°	[illegible]	2.00	4.35×10^{8}	[illegible]	[illegible]	2.45×10^{8}	0.11	0.02	*	0.16	0.29	1.71	1.15	1.97	0.097
500	15°	[illegible]	1.70	[illegible]	[illegible]	2.97×10^{8}	1.26×10^{8}	0.06	0.01	*	0.086	0.15	1.55	1.15	1.78	0.051
30 2	33°	Film [illegible]	~3000*	1.60×10^{13}	[illegible]	2.60×10^{13}	9.86×10^{11}	363	210	*	576	1149	~1900	1.25	~2400	620
52.5	33°	[illegible]	1900	5.24×10^{11}	[illegible]	1.5×10^{12}	6.45×10^{11}	119	128	*	189	436	1460	1.25	1830	24[illegible]
76 4	33°	[illegible]	700	[illegible]	9.94×10^{11}	6.30×10^{11}	2.54×10^{11}	58.4	51.0	*	92.6	202.0	498	1.25	623	99.1
101 3	33°	[illegible]	435	1.67×10^{11}	4.86×10^{11}	2.84×10^{11}	1.36×10^{11}	39.7	33.4	*	63.0	136.1	299	1.25	374	53.1
126	33°	[illegible]	255	8.98×10^{10}	[illegible]	2.08×10^{11}	7.47×10^{10}	20.4	17.0	*	32.3	69.7	185	1.25	231	30.0
150	33°	[illegible]	159	5.97×10^{10}	1.72×10^{11}	6.99×10^{10}	[illegible]	13.5	11.5	*	21.4	46.4	113	1.25	141	17.3
175	33°	[illegible]	121	3.84×10^{10}	7.0×10^{10}	5.00×10^{10}	2.00×10^{10}	8.64	6.40	*	13.8	20.64	92.2	1.25	115	13.0
100	240°	Film [illegible]	320	1.31×10^{11}	[illegible]	1.87×10^{11}	[illegible]	29.8	10.3	*	46.1	86.2	234	1.25	293	26.1
200	240°	[illegible]	70	2.37×10^{10}	4.00×10^{10}	3.7×10^{10}	8.40×10^{9}	5.39	2.35	*	8.36	16.1	54	1.25	68	5.66
300	240°	[illegible]	26	7.23×10^{9}	[illegible]	-	4.33×10^{9}	1.64	1.06	*	2.55	5.25	21	1.25	26	2.04
400	240°	[illegible]	10.3	3.07×10^{9}	[illegible]	-	1.17×10^{9}	0.67	0.75	*	1.08	2.50	7.80	1.25	9.75	1.13
500	240°	[illegible]	5.4	1.41×10^{9}	[illegible]	-	-	0.35	0.08	*	0.50	0.93	4.5	1.25	5.6	0.43
600	240°	[illegible]	3.0	6.20×10^{8}	[illegible]	-	-	0.16	0.06	*	0.22	0.44	2.6	1.15	3.0	0.29

*0.55 cm thick pipe nipple.

8

TABLE [illegible] INITIAL GAMMA DOSE DATA - OPERATION HARDTACK, SHOT SOCORRO

Slant Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Pu	Np	U	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
[illegible]			r	[illegible]	[illegible]	[illegible]	[illegible]	r	r		r	r	r		r	r
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	73.3	7,700	1.05	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.9	35.9	4,270	1.05	4,450	759
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16.1	16.3	2,100	[illegible]	[illegible]	307
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.7	10.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.73	0.73	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	170	12.[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	77	4.35



(U)
Figure 3.85 ~~(S-RD)~~ Operation Hardtack - Shot Hamilton - Corrected gamma-dose-times-slant-range-squared versus slant range (U).

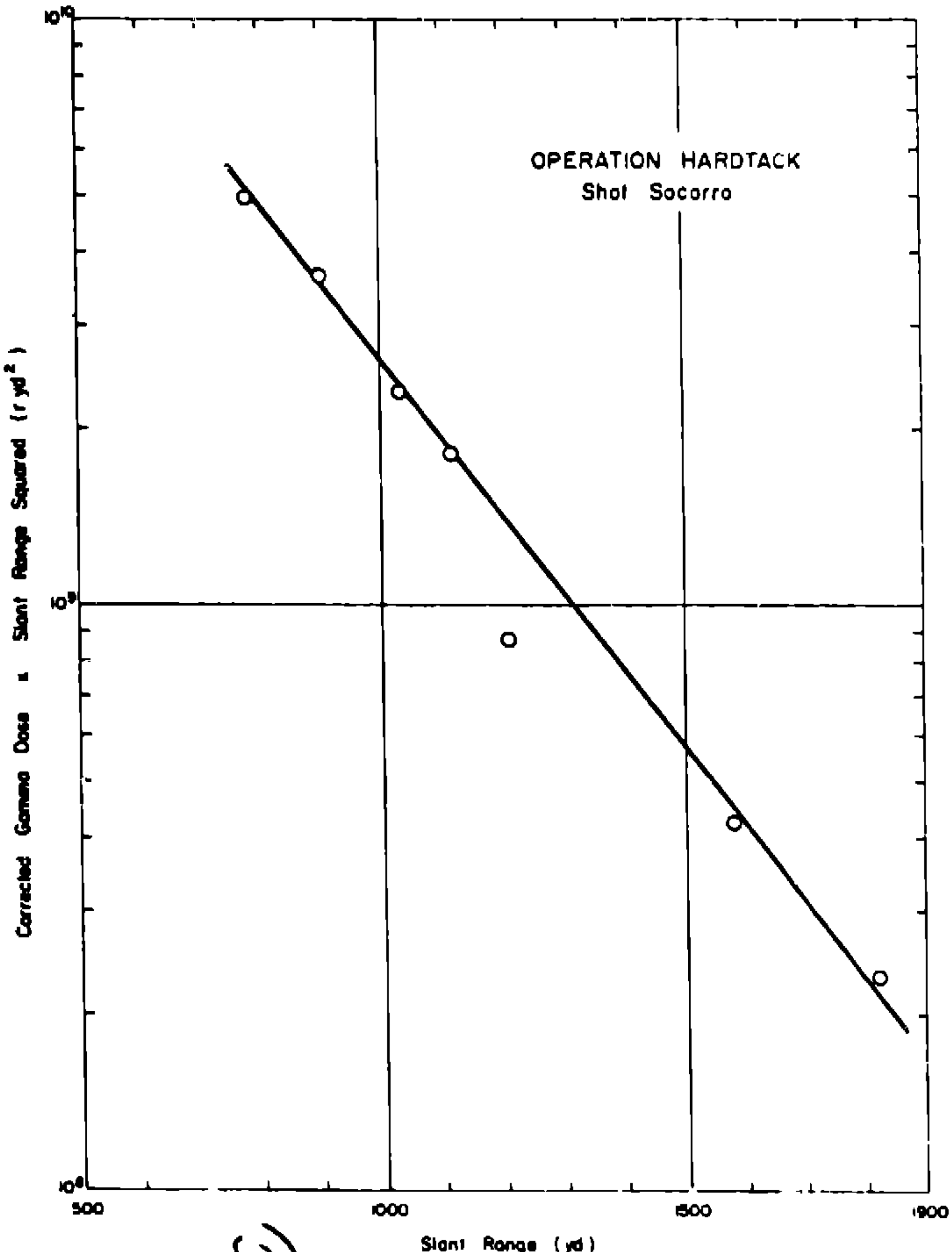


Figure 3.86 (S-RD) (U) Operation Hardtack - Shot Socorro - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.11[5] INITIAL GAMMA DOSE DATA - OPERATION HARDTACK, SHOT HUMBOLDT

Slant Range	Air-mult	Type of Detector	Uncorrected Gamma Dose	Neutron Flux: Au	Neutron Flux: Pu	Neutron Flux: Np	Neutron Flux: U	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
[illegible]	a	Film [illegible]	21,000	[illegible]	3.60x10^13?	[illegible]	[illegible]	1940	12,400	b	6070	19,430	3600	1.25	12,000	5090
[illegible]7	a	[illegible]	8,[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	473	3,400	b	[illegible]	5,773	2600	1.25	3,300	1240
10[illegible]	a	[illegible]	~3,000	1.12x10^[illegible]	2.[illegible]x10^[illegible]	[illegible]	[illegible]	127	962	b	404	1,493	~1500	1.25	~1,900	286
[illegible]	a	[illegible]	600	2.[illegible]	6.17x10^11	[illegible]	1.1[illegible]x10^11	49.3	31.8	b	61.2	162	438	1.25	548	57.9
[illegible]	a	[illegible]	230	[illegible]	1.[illegible]x10^11	[illegible]	[illegible]	16.1	9.70	b	26.7	52.[illegible]	177	1.25	221	18.3
[illegible]	a	[illegible]	91	2.2[illegible]x10^10	5.72x10^10	[illegible]	1.[illegible]1x10^10	4.82	3.00	c	4	[illegible]	53	[illegible]	53	5.29
[illegible]	a	[illegible]	15.2	[illegible]	2.12x10^10	[illegible]	4.44x10^9	1.83	1.51	c	4	3.34	11.9	1.0	11.9	1.96
[illegible]00	a	[illegible]	8.6	[illegible]	1.19x10^10	[illegible]	2.44x10^9	1.00	0.821	c	4	1.87	6.8	1.0	6.8	1.11
[illegible]	a	[illegible]	4.7	2.70x10	6.22x10^9	[illegible]	1.61x10^9	0.68	0.114	c	4	0.79	3.9	1.0	3.9	0.61

[illegible]

[illegible] nipple

[illegible] base of post.

Unknown.

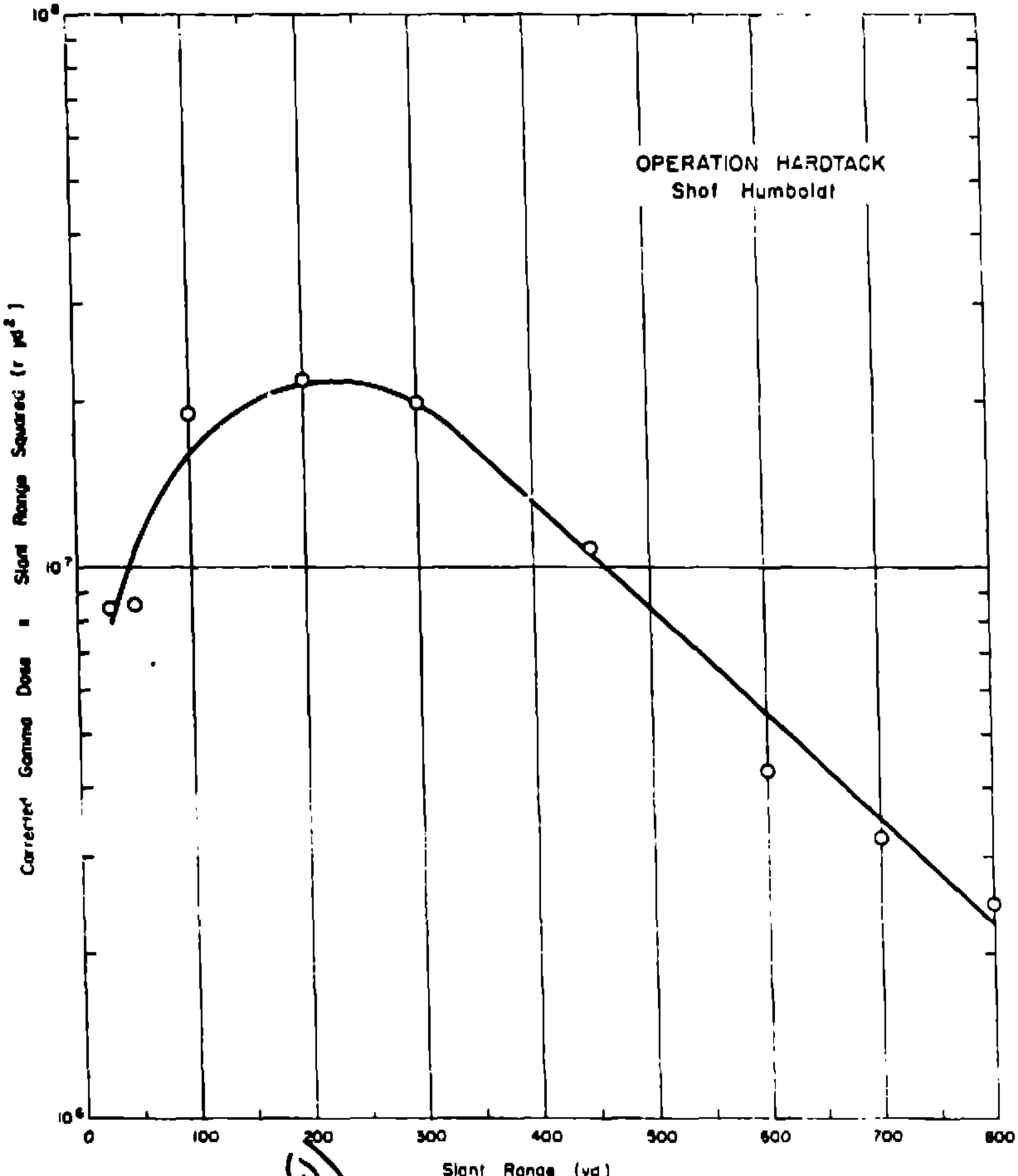


Figure 3.37 (S-RD) Operation Hardtack - Shot Humboldt - Corrected gamma-dose-times-slant-range-squared versus slant-range (U).

(U) TABLE 3.119 SHOT INFORMATION - OPERATION SUN BEAM

Shot Designation	Date and Time Fired	Location and Type	Height of Burst	Yield Total
			ft	kt
Little Feller II	7 July 1962 1900:00 GMT	Area 18-Surface	3	
Johnnie Boy	11 July 1962 1645:00 GMT	Area 18-Underground	[illegible]	0.5
Small Boy	14 July 1962 1830:00 GMT	F. F. - Surface	10	
Little Feller I	17 July 1962 1700:01 GMT	Area 18-Surface	~3	

(U) TABLE 3.120 METEOROLOGICAL DATA - OPERATION SUN BEAM

Shot	Pressure	Temperature	Density	ρ/ρ_s	$(\rho_s/\rho)^{x}$
	mb	°K	$g/cm^3 \times 10^3$		
Little Feller II	[illegible]	309.5	[illegible]	0.76	1.53
Johnnie Boy	[illegible]	297.3	1.00	0.77	1.64
Small Boy	[illegible]	304.7	1.03	0.77	1.60
Little Feller I	866	302.7	0.97	0.75	1.79

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(V)

TABLE [illegible] INITIAL GAMMA DOSE DATA - OPERATION SUN BEAM, SHOT JOHNIE BOY

Ground Range	Azimuth	Type of Detector	Uncorrected Gamma Dose	Neutron Flux Au	Pu	Np	U	Au Thermal Correction	Fast Correction	Shield Type	Shield Correction	Total Correction	Corrected Gamma Dose	Attenuation Factor	Final Corrected Gamma Dose	Soil Contribution
yd			r	n/cm²	n/cm²	n/cm²	n/cm²	r	r		r	r	r		r	r
90	a	Cobalt	700,000	1.96×10^{14}	2.20×10^{13}	9.04×10^{12}	4.72×10^{12}	d	440	b	[illegible]	71,740	628,000	1.25	785,000	e
120	a	Cobalt	655,000	1.52×10^{14}	1.65×10^{13}	6.20×10^{12}	3.07×10^{12}	d	330	c	55,300	55,300	579,000	1.25	749,000	e
1[illegible]	[illegible]	Cobalt	590,000	7.26×10^{13}	1.27×10^{13}	4.81×10^{12}	2.20×10^{12}	d	254	b	26,4[illegible]	[illegible]	493,000	1.25	616,000	e
[illegible]	[illegible]	Glass	212,000	3.44×10^{13}	9.46×10^{12}	3.21×10^{12}	1.21×10^{12}	d	158	b	12,700	12,858	199,000	1.25	249,000	e
[illegible]25	a	Cobalt	230,000	3.44×10^{13}	9.48×10^{12}	3.21×10^{12}	1.21×10^{12}	[illegible]	190	b	12,700	12,910	217,000	1.25	271,000	e
300	a	Glass	93,000	3.39×10^{13}	4.39×10^{12}	1.57×10^{12}	6.43×10^{11}	d	73.2	b	12,100	12,173	80,900	1.25	101,000	e
400	a	Cobalt	109,000	3.39×10^{13}	4.39×10^{12}	1.57×10^{12}	6.43×10^{11}	d	87.8	b	12,100	12,188	95,900	1.25	120,000	e
4[illegible]	a	Film 649	26,000	1.60×10^{13}	1.96×10^{12}	8.63×10^{11}	[illegible].09$\times10^{11}$	d	1,030	b	5,820	6,850	19,200	1.25	24,000	e
4[illegible]	a	Glass	29,000	[illegible]	1.96×10^{12}	8.61×10^{11}	[illegible]	d	32.7	b	5,820	5,853	23,200	1.25	29,000	e
4[illegible]0	a	Cobalt	31,000	[illegible]	1.96×10^{12}	8.62×10^{11}	[illegible].09$\times10^{11}$	d	39.2	b	5,820	5,859	25,100	1.25	31,400	e
[illegible]00	a	Film 649	11,700	[illegible]	[illegible]	3.83×10^{11}	1.41×10^{11}	d	990	b	1,420	2,510	9,190	1.25	11,500	e
[illegible]00	a	Glass	12,000	[illegible]	1.12×10^{12}	3.83×10^{11}	1.41×10^{11}	d	13.7	b	1,420	1,434	10,100	1.25	12,600	e
6[illegible]	a	Cobalt	14,000	[illegible]	1.12×10^{12}	3.83×10^{11}	1.41×10^{11}	d	27.6	b	1,920	1,948	14,100	1.25	17,600	e
7[illegible]	a	Film 649	6,000	[illegible]	[illegible]	2.80×10^{11}	9.80×10^{10}	d	341	b	1,022	1,363	4,640	1.25	5,800	e
[illegible]0	a	Glass	7,200	[illegible]	[illegible]	[illegible]	9.80×10^{10}	d	10.9	b	1,022	1,033	[illegible],170	1.25	7,710	e
900	a	Film 649	3,[illegible]	[illegible]	5.37×10^{11}	[illegible]	5.28×10^{10}	d	272	b	331	603	3,000	1.25	3,750	e
900	a	Glass	4,500	[illegible]	[illegible]	[illegible]	5.28×10^{10}	c	8.62	b	331	339.6	4,160	1.25	5,550	e
1,200	a	Film 1290	1,400	[illegible]	[illegible]	5.12×10^{10}	2.90×10^{10}	d	9.42	b	70.2	79.6	1,320	1.25	1,650	e
1,200	a	Glass	1,640	[illegible]	[illegible]	5.12×10^{10}	2.90×10^{10}	d	2.38	b	70.2	73.2	1,570	1.25	1,960	e
1,500	a	Film 1290	[illegible]	[illegible]	1.11×10^{11}	[illegible]	7.85×10^{9}	d	5.84	b	[illegible]	39.1	[illegible]	1.25	764	e
1,[illegible]	a	Glass	650	[illegible]	1.11×10^{11}	[illegible]	7.85×10^{9}	d	1.85	b	[illegible]	35.2	[illegible]	1.25	759	e
[illegible]	a	Glass	310	[illegible]	[illegible]	2.40×10^{10}	5.37×10^{9}	d	0.78	b	[illegible]	7.54	343	1.15	440	e
2,1[illegible]	a	Film 1290	220	[illegible]	2.77×10^{10}	1.20×10^{10}	[illegible]	d	1.19	b	[illegible]	4.35	[illegible]	1.15	24[illegible]	e
2,1[illegible]	a	Glass	240	[illegible]	2.27×10^{10}	1.20×10^{10}	[illegible]	d	0.34	b	[illegible]	3.54	237	1.15	273	e
2,[illegible]	a	Film 1290	140	[illegible]	[illegible]	[illegible]	2.42×10^{9}	d	0.62	b	[illegible]	2.25	13[illegible]	1.15	159	e
2,4[illegible]	a	Glass	125	[illegible]	[illegible]	[illegible]	2.42×10^{9}	d	0.20	b	[illegible]	1.43	133	1.15	153	e
3,0[illegible]	a	Film 1290	50	[illegible]	3.20×10^{9}	[illegible]	1.94×10^{9}	d	0.17	c	[illegible]	0.60	55.4	1.15	63.7	e
3,000	a	Glass	45	[illegible]	3.20×10^{9}	[illegible]	1.94×10^{9}	d	0.05	c	0.43	0.48	44.5	1.15	44.5	e

[illegible]
[illegible] w/1.1[illegible].
[illegible] calculated
[illegible] negligible.

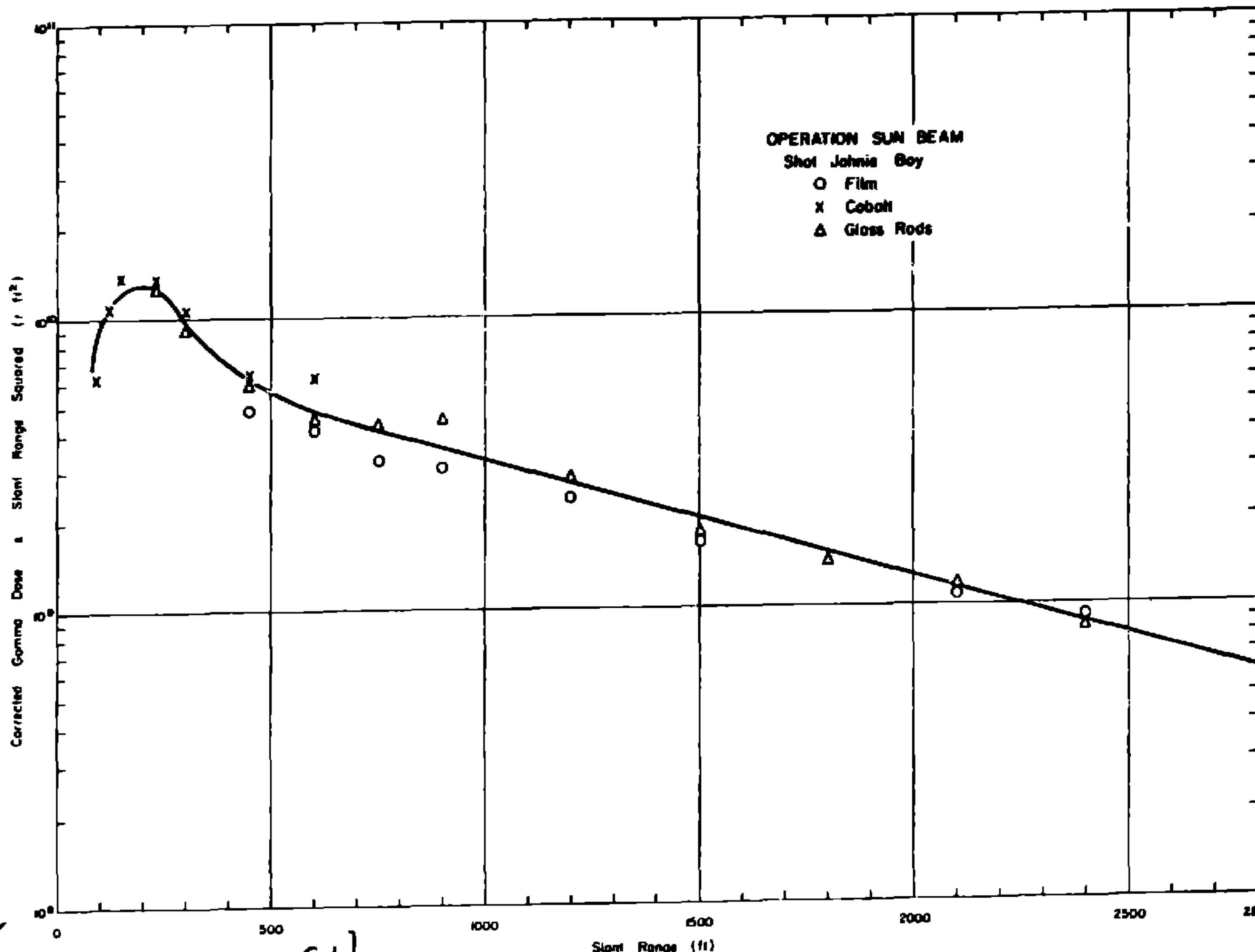

Figure 3.90 ~~(S-RD)~~ (U) Operation Sun Beam - Shot Johnnie Boy - Corrected gamma-dose times-slant-range-squared versus slant range (U).

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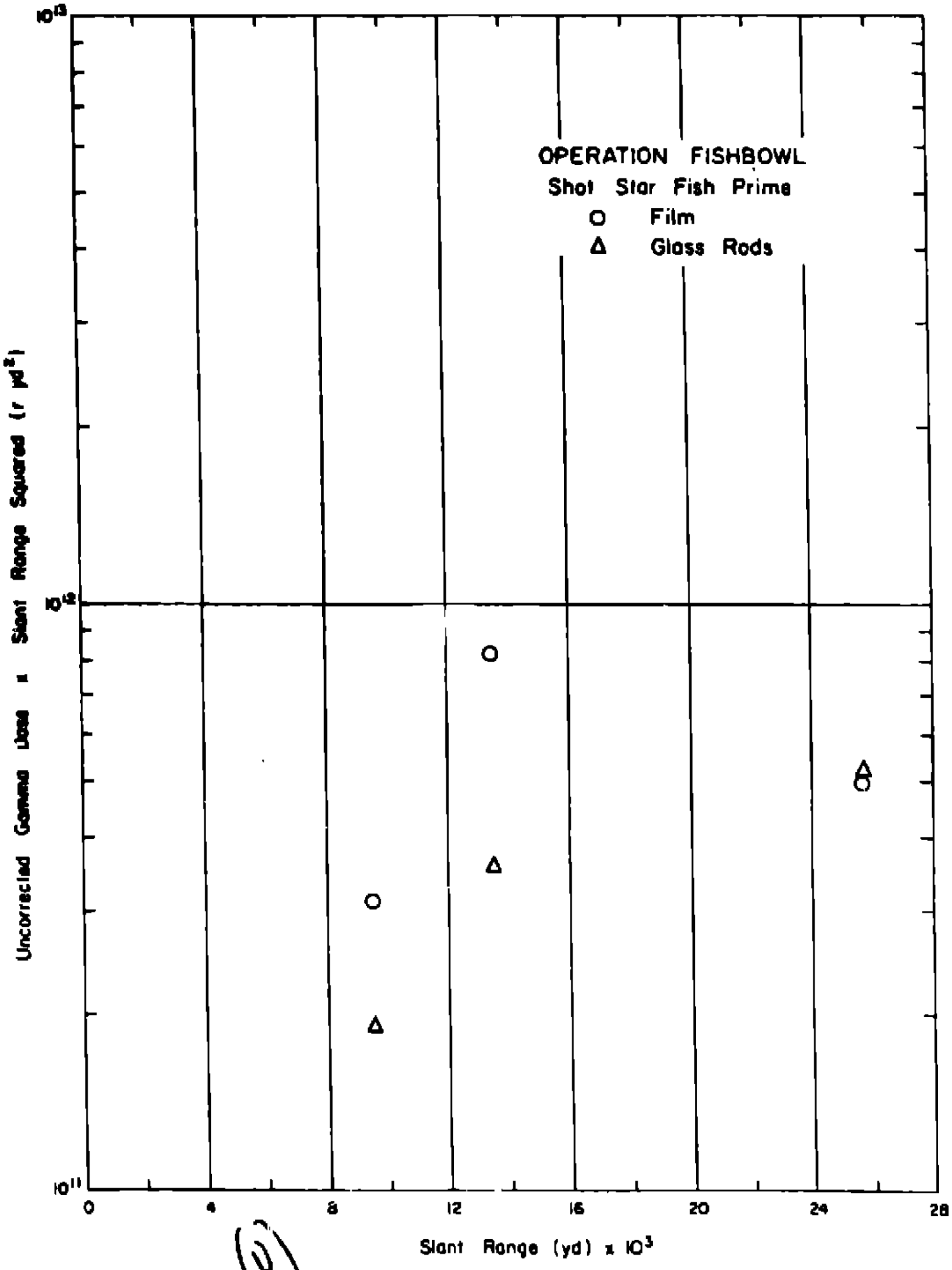

(U)

Figure 3.94 ~~(S-RD)~~ Operation Fish Bowl - Shot Star Fish Prime Uncorrected gamma-dose-times-slant-range-squared versus slant-range (U).

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(S-RD) 4. The gold, fast, and shield corrections are added and this value is subtracted from the uncorrected gamma dose to give a corrected gamma dose:

$$17{,}500r - (408 + 3590 + 1230) = 12{,}272r = 12{,}300r$$

(S-RD) 5. To correct for the gamma attenuation of the shield, gamma attenuation factors for each shield type were calculated for gamma energies of 1, 3, and 5 MeV using $\frac{1}{e^{-\mu x}}$ to calculate the attenuation factor. The appropriate attenuation factor for the slant range and shot yield was multiplied by the corrected gamma dose to obtain the final corrected gamma dose:

$$12{,}300r \times 1.14 = 14{,}022r = 14{,}000r.$$

(S-RD) 6. To save time, "magic numbers" which are the soil gamma dose for 1×10^{12} thermal neutrons per square centimeter and for 1×10^{12} fast neutrons per square centimeter were calculated for Nevada-type soil, coral, and water using the methods outlined in Reference 5. To calculate the soil contribution, the thermal "magic number" is multiplied by the thermal-neutron flux divided by 1×10^{12} n/cm^2 and added to the fast-neutron "magic number" multiplied by the fast-neutron flux (Pu) divided by 1×10^{12} n/cm^2. This result is multiplied by k using the formula:

$$1 - k = \frac{\sqrt{R} - 1}{\sqrt{R} + \sqrt{3} \cos \theta}$$

where θ = angle between normal to surface of ground and path of neutron beam from point of detonation

$$R = \frac{\sigma_s}{\sigma_a}$$

where

σ_s = microscopic scattering cross section of soil
σ_a = microscopic absorption cross section of soil

and then multiplied by the build-up factor for soil.

The constants for Nevada-type soil are:

Thermal "Magic Number" = 523r

Fast "Magic Number" = 351r

$\sqrt{R}$ = 8.17

Build-up factor = 1.3

$$\left(523r \times \frac{3.59 \times 10^{12}\ n/cm^2}{1 \times 10^{12}\ n/cm^2}\right) + \left(361r \times \frac{1.04 \times 10^{13}\ n/cm^2}{1 \times 10^{12}\ n/cm^2}\right)$$

$$1878r + 3754r = 5632r$$

$$\cos \theta = \frac{500\ yds}{1119\ yds} = 0.447$$

$$1 - k = \frac{7.17}{8.17 + \sqrt{3} \times 0.447} = \frac{7.17}{8.17 + .773} = \frac{7.17}{8.943} = 0.802$$

$k = 0.198$

5632r x 0.198 = 1115r x 1.3 =1449r = 1450r which is the soil contribution.

(U) To correct the burst conditions to standard air density the following formulae for correcting the slant range and dose must be used. Standard density, ρ_s, is defined as 1.293×10^{-3} g/cm^3, the density of dry air at 0°C and one atmosphere pressure.

The corrected slant range, R_s, is given by

$$R_s = \frac{\rho}{\rho_s} R$$

and the corrected dose, D_s, is given by

$$D_s = \left(\frac{\rho_s}{\rho}\right)^2 D$$

with ρ/ρ_s given by

$$\rho/\rho_s = 0.269 \frac{P_o}{T} (C_o - C_1 + C_2 - C_3 + . . .)$$

where $C_o = 1$
$C_1 = 1/2(0.269 \times 10^{-3} \rho_s g y/T)$
$C_2 = 1/6(0.269 \times 10^{-3} \rho_s g y/T)^2$
$C_3 = 1/24(0.269 \times 10^{-3} \rho_s g y/T)^3$
.
.
.
P_o = pressure at the detector, mb
g = acceleration due to gravity, cm/sec^2
y = height of burst, cm
T = temperature, °K

(U) The slant range and dose-correction factors were so calculated by approximating ρ/ρ_s via the parameter y/t that only those C's whose values were equal to or greater than 0.01 were included. Inclusion of only C_o assumes, in effect, a constant density between source and detector. Inclusion of C_o and C_1 assumes a linear variation in density with height between source and detector. Inclusion of all the C's assumes an exponential variation in density with height.

(U) For the Teapot and Plumbbob series where both the ground and burst conditions are available, the correction factor is given by

$$\rho/\rho_s = \frac{0.269}{2}\left(\frac{P_a}{T_a} + \frac{P_b}{T_b}\right)$$

where

a = ground conditions
b = burst height conditions

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